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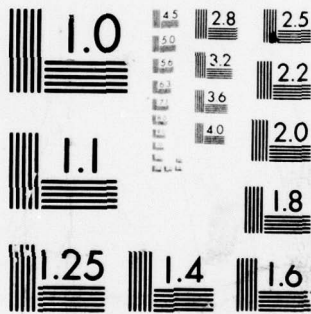
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Operational Manual
Volume VII

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Looking Glass, Inc. Norm Tables

Morgan W. McCall, Jr.
Michael M. Lombardo
Susan S. Rice

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contained in the simulation are based on actual events.

This report contains norm tables based on ten standardized runs of Looking Glass. Descriptive data are provided on 1) participant background, 2) activity patterns, 3) organizational climate, 4) power distributions, 5) information flow and decision processes, and 6) performance. Also included are breakdowns of selected variables for banking versus manufacturing organizations and for different levels and positions in the simulation.

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LOOKING GLASS, INC.

NORM TABLES

Morgan W. McCall, Jr.

Michael M. Lombardo

Susan S. Rice

Operational Manual Volume VII

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contract No. N00014-76-C-0870; NR 170-825; and by the Center
for Creative Leadership.

Notice

The material contained herein relates to a simulation of managerial performance developed by the Center for Creative Leadership pursuant to a contract with the Office of Naval Research. The context of the simulation is a fictitious corporation in the American glass industry. Any points of similarity between the simulation and an existing glass company are purely coincidental.

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Description of Volumes

Looking Glass is a simulation of a glass manufacturing corporation. There are twenty positions, ranging across three divisions and four levels (Plant Manager, Director, Vice-President, and President). The divisions face different environments, ranging from volatile to stable. Looking Glass is, in a word, typical--the organizational type, structure and environments are common. All problems contained in the simulation are based on actual events.

This is Volume VII of the Looking Glass Operational Manuals. It contains descriptive data from ten standardized simulation runs conducted in 1979 and forms a comparative base for researchers and trainers. Included are data on sample demographics, activity patterns, organizational climate, power, information processing and decision-making, and performance.

Volume I of the simulation materials describes the development of Looking Glass, research issues, training uses of the simulation, and the nuts and bolts of running the simulation.

Volumes II through IV contain the simulation materials. Volume II contains all memos relating to the Advanced Products Division, and also includes organization-wide corporate memos, and all memos to the President. Volume III contains all memos relating to the Commercial Glass Division, and Volume IV, all memos concerning the Industrial Glass Division.

Volume V, the Outside Information Notebook, contains information available by phone to Looking Glass managers. Also in Volume V are detailed instructions for staff members handling "ghost" roles.

Volume VI is a complete index of the simulation materials in Volumes II through IV.

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I. INTRODUCTION

Once upon a time, statisticians only explored. Then they learned to confirm exactly--to confirm a few things exactly, each under very specific circumstances. As they emphasized exact confirmation, their techniques inevitably became less flexible. The connection of the most used techniques with past insights was weakened. Anything to which a confirmatory procedure was not attached was described as "mere descriptive statistics", no matter how much we had learned from it.

(Tukey, 1977, vii)

This report is all about "mere descriptive statistics." While future reports will move in the direction of confirmatory analysis, our intent here is to apply the brush of description to the results from ten runs of an organizational simulation called Looking Glass. Designed as a tool for research on leadership in complex organizational systems, Looking Glass began in September, 1976, under sponsorship by the Office of Naval Research and the Center for Creative Leadership. The first two years of development and field testing have been documented in McCall and Lombardo (1978) and will not be reviewed here.

This volume is intended primarily for two audiences, researchers and trainers. For researchers, the descriptive data are useful for hypothesis formation and as a "control" against which to compare the results from experimental manipulations of Looking Glass. For trainers, these data can be used as a norm set showing how, under standard conditions, Looking Glass participants are likely to behave.

Looking Glass

Looking Glass is a six-hour simulation of a moderate-sized manufacturing corporation. In each standardized run twenty participants are assigned to twenty top management roles ranging from President to Plant Manager and spanning three divisions. Their task: to run the company for a day in anyway they want.

The simulation begins the evening before the run with a series of events designed to familiarize participants with the company, their roles, and each other. During this session, participants and staff are introduced, a slide show explaining the company is shown, participants are assigned roles and spend some time at their desks, and job descriptions and annual reports are distributed. This is followed by some time for the participants to socialize.

The following morning Looking Glass opens for business. Each participant spends the first 45-minutes at his or her desk reviewing an in-basket containing today's mail. Each in-basket contains 28 to 50 items ranging from the trivial (e.g., wine sale prices) to the significant (e.g., cost figures on plant expansion).

After the first 45-minutes, the telephone system is turned on and the managers are free to call meetings, send memos, place phone calls, etc. Using memo or phone, participants can contact anyone inside or outside the company. Trained staff play these "ghost" roles using standardized responses to the most commonly asked questions.

The simulation concludes with a brief address by the President and a lengthy session of filling out questionnaires. For all runs reported here, the simulation was followed by one to three days of training conducted by the staff of the participating organization.

The development of Looking Glass insured that a range of management problems and issues exist in the company. They cover many areas, including finance, personnel, legal, production, sales, R&D, safety, etc. Examples of the issues include:

- an opportunity to acquire a new plant
- deciding what to do with a plant that has lost money the last few years
- pollution and discrimination problems
- supply shortages
- production capacity limits
- a lawsuit with a major customer
- competition with foreign manufacturers

There are three divisions in Looking Glass, each of which faces a different kind of external environment. The Advanced Products Division (APD) manufactures products for the electronics and communications industries and exists in an unstable, highly volatile business environment. The Commercial Glass Division (CGD) makes light bulb casings and flat glass, and it faces a reasonably stable, predictable

environment characterized by high volume, low margin products and well established customer relations. The Industrial Glass Division (IGD) faces an environment containing both unstable and stable components because it makes products varying from auto glass (relatively stable) to space craft windows (highly unstable).

Figure I-1 is the organization chart of the "live" roles in Looking Glass. It also shows the divisional structure and the major product lines. This figure will be a useful reference for the tables presented in this report.

Measures Used in Looking Glass

Looking Glass generates an incredible array of behaviors during a six-hour period. It is impossible to measure all that is of interest, or to report here all that was measured. In the ten standardized runs used to create the tables in this report, the following measures were collected:

- participant background characteristics
- activity-pattern time samples
- information flow and decision making questionnaires (DMQ's)
- an adapted form of the Survey of Organizations (Taylor & Bowers, 1972)
- a measure of power distributions
- logs of information requests
- memo distribution records
- performance ratings

In the sections that follow, the measures and procedures are explained and results reported.

The Sample

Section II reports in detail the background characteristics of the 200 participants in the ten runs. As is clear from the tables, the vast majority were managers. Four of these runs were with bank managers, five with managers from manufacturing organizations, and one consisted of a specially formed group of women managers.

Assignment of individuals to specific positions in Looking Glass was not random. However desirable random assignment may be for research purposes, it does not reflect

the process that goes on in organizations as members climb the position ladder. In each of the ten runs, participants were assigned to positions by the training staff using the following guidelines: 1) the relative hierarchical status of participants was preserved by having more senior managers assigned to more senior roles in Looking Glass; 2) people who reported to other participants in real life were assigned to different divisions in Looking Glass; and 3) participation was voluntary.

All participants attended Looking Glass as part of a management training program and were fully informed of the use of the data in a research project. In nine of the ten runs, all twenty participants were drawn from the same organization; the exception was the special run for women where participants came from different organizations.

Outline of the Volume

In the sections that follow, data are reported by topic. In most cases, the topic will correspond to a specific measure, although the lengthy decision-making questionnaire has been subdivided along topical grounds (e.g., the information flow and decision process in one section, priority setting and performance measures in another).

Sections II through VII are organized in the same way. The first few pages describe the measure(s) used, the data collection procedures, and highlights of the results. This is followed by a series of tables reporting data from Looking Glass, its divisions, bank versus manufacturing managers, and hierarchical level in the Looking Glass simulation.

Section II deals with participant demographics, III with activity patterns, IV with organizational climate, V with power distributions, VI with information flow and decision process, and VII with individual, divisional, and organizational performance. The appendix contains item-level data from the decision-making questionnaires.

The user, researcher or trainer, can view these tables as basic descriptive norms for Looking Glass. The volume will be updated as additional runs accumulate and will eventually include separate norms for British managers.

With the exception of Section VII (Performance), these norms do not reflect "good" or "bad" performance. They simply report what was done in the ten runs and the variability of responses in them. The user should be extremely careful in making evaluative judgments. Interpretation should always be made in the context of the samples used to

create the norms, the purposes of the measures employed, and the number of runs reported. Any variation in standard run procedures affects the validity of any norm comparisons.

The Spirit of the Report

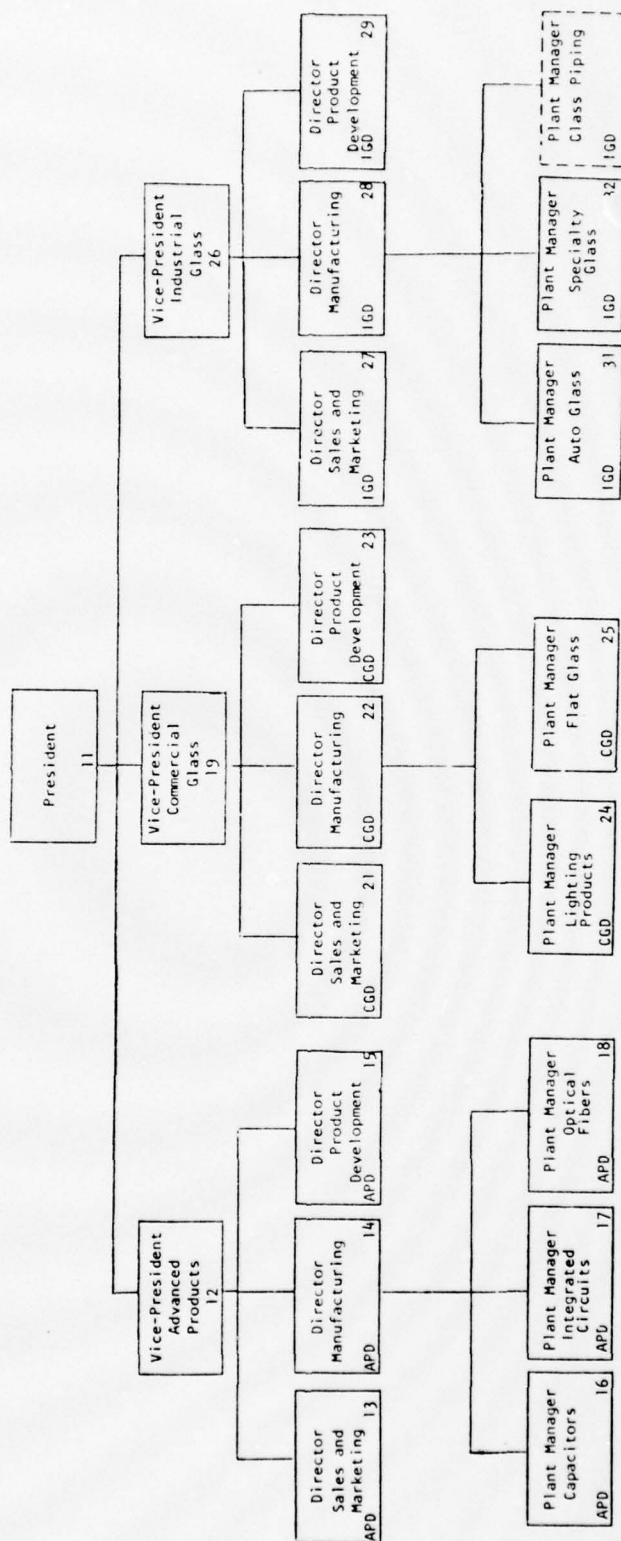
In discussing the mechanisms of disease, Lewis Thomas said:

The record of the past half century has established, I think, two general principles about human disease. First, it is necessary to know a great deal about underlying mechanisms before one can really act effectively; one had to know that the pneumococcus causes lobar pneumonia before one could begin thinking about antibiotics. One did not have to know all the details, not even how the pneumococcus does its damage to the lungs, but one had to know that it was there, and in charge.

(Thomas, 1979, 168)

Looking Glass is a tool designed to get at the underlying mechanisms of leadership in a complex system. It is predicated on the assumption that we need to know more about what's there and what's in charge if we are to understand the complexities of effective leadership behavior. This report, dealing as it does with a limited number of variables, is only a first step in the exploration. The descriptive data do show some marked contrasts across runs, divisions, levels, and managerial background. It is hoped that these contrasts will stimulate inquiry, encourage "whys?", for researchers and for managers. If we can ask enough of the right questions, we may begin to unravel and understand the "extraordinary human adventure and accomplishment of the managerial role" (Sayles, 1979, xiv).

LOOKING GLASS, INC.



• McCall, Lombardo, DeVries 1978
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Figure I-1

II. PARTICIPANT DEMOGRAPHICS

Introduction

During the course of the norming, we collected background information from each participant so that the characteristics of the sample could be examined. (See Figure II-1 for sample form). On the following pages are demographic data for three categories: the entire sample, bank managers and manufacturing managers, and by the level the participant held in the Looking Glass simulation.

The demographics include:

1. functional responsibilities of participants
2. sex
3. age
4. proportion of participants who were managers
5. number of subordinates reporting directly to the managers among LGI participants
6. number of direct and indirect subordinates reporting to the managers among LGI participants
7. management experience of LGI participants
8. management levels of LGI participants

LOOKING GLASS, INC.

PARTICIPANT BACKGROUND FORM

Looking Glass, Inc., was developed by the Center for Creative Leadership, a non-profit, educational institution in Greensboro, North Carolina. Looking Glass is a research and training vehicle. This form permits the Center to know something about the kinds of people participating in the simulation. The information requested will be treated as confidential in accordance with Center policy regarding individual privacy.

1. Name _____
2. Title _____
3. Organization _____
4. Mailing Address _____

5. Your division or branch (if any): _____
6. Your primary functional responsibility (for example, manufacturing, personnel, finance, sales, etc.). Please refer to the attached list of functions and write the number in this blank: _____. If your function is not listed, please write it in on the line below:

7. Are you ____ male or female ____?
8. Your approximate age is:

____ (1) under 30	____ (4) 41-45	____ (7) 56-60
____ (2) 31-35	____ (5) 46-50	____ (8) 61-64
____ (3) 36-40	____ (6) 51-55	____ (9) over 65

Figure II-1

9. Please check your assigned position in Looking Glass:

<input type="checkbox"/> VP	<input type="checkbox"/> VP	<input type="checkbox"/> VP
<input type="checkbox"/> DIR-S&M	<input type="checkbox"/> DIR-S&M	<input type="checkbox"/> DIR-S&M
<input type="checkbox"/> DIR-MFG	<input type="checkbox"/> DIR-MFG	<input type="checkbox"/> DIR-MFG
<input type="checkbox"/> DIR-PD	<input type="checkbox"/> DIR-PD	<input type="checkbox"/> DIR-PD
<input type="checkbox"/> PM-CAPACITORS	<input type="checkbox"/> PM-LIGHTING	<input type="checkbox"/> PM-AUTO
<input type="checkbox"/> PM-INT CIRCS	<input type="checkbox"/> PM-FLAT	<input type="checkbox"/> PM-SPECIALTY
<input type="checkbox"/> PM-OPT FIBERS APD	<input type="checkbox"/> CGD	<input type="checkbox"/> IGD

SUPERVISORS/MANAGERS:

PLEASE FILL OUT THE QUESTIONS IN THIS BOX

10. How many people report directly to you on a regular basis? ____
11. Approximately how many people do you have direct and indirect management responsibility for? (For example, a general manager may have eight direct reports and be responsible for 1000 others through the chain of command. This would be a total of 1008).
- ____ (1) less than 10 ____ (4) 1001 - 10,000
- ____ (2) 10 - 100 ____ (5) more than 10,000
- ____ (3) 101 - 1000
12. How long have you been a manager (in total)? ____ years.
13. How long have you been in your present position in your organization? ____ years.
14. If your entire organization were "squeezed" into the categories below, at what level would you be?
- ____ Top Executives
- ____ Upper Middle Managers
- ____ Lower Middle Managers
- ____ First Level Managers

Figure II-1

PARTICIPANT BACKGROUND FORM (Cont.)

15. As part of the Center's ongoing research with the Looking Glass simulation, our research staff may need to contact people like you who have gone through the simulation. Assuming that our requests are reasonable and that information you gave would be treated in confidence, would you be willing to participate in future research?

☐ I am willing to be contacted about future research.

☐ I would prefer not to participate in future research.

FUNCTIONAL RESPONSIBILITY

Use one of these
numbers on item 6

01	Administration
02	Engineering
03	Finance
04	Labor Relations
05	Manufacturing
06	Marketing
07	Operations
08	Personnel/Human Resources
09	Public Relations
10	Purchasing
11	Research and Development
12	Sales
13	Security

Figure II-1

HIGHLIGHTS

Sample Characteristics (Tables II-1 - II-8)

Assessing the adequacy of a sample requires that the nature of the universe of managers be known. Incredibly, we could find no comprehensive statistics on managers, even though several libraries searched their reference files.

Left with little to use as a guide, we can say that the sample was overwhelmingly managerial; that except for labor relations and security, all management functions had multiple representatives; that age of participants clustered around the national median; and that the vast majority had a small number of direct and indirect reports. One direct bit of evidence we uncovered is that the managerial population of the U.S. is 77% male and 23% female.¹ In our sample, the corresponding figures were 76% and 24%.²

The modal participant in Looking Glass was a thirty-three year old male in finance, personnel, or administration with three or four subordinates. He was most likely to be in lower middle management with about six years of total management experience and two-and-a-half in his present job.

The sample is probably not representative in two respects. First, although the levels of LGI participants are normally distributed, LGI was intended for top and upper middle managers (less than 28% of the sample falls in those categories). Second, staff managers may be overrepresented.

Overall, the sample is an adequate representation of different management levels and functions. Although not primarily composed of top managers, it is at least composed of middle managers.

¹Statistical Abstract of the U.S. 1978

²One run of Looking Glass was exclusively female; excluding it, the sample was 82% male, 18% female. However, since the Statistical Abstract has a more liberal definition of management than we used, the comparison is tenuous at best.

Banking and Manufacturing Managers (Table II-9 - II-16)

Banking and manufacturing samples differed in the following ways:

<u>Banking</u> ³	<u>Manufacturing</u>
More finance & administration managers	More engineering & manufacturing managers
More females	
More managers under 30	
More managers with 4-6 subordinates	More managers with 1-3 subordinates
More upper middle managers	More first level managers

Bank managers had about two more years experience than their counterparts in manufacturing, probably because there were more upper level bank managers and first level manufacturing managers in the sample. There were no differences in the proportion from each organization that were managers.

Different Levels in Looking Glass (Tables II-17 - II-24)

In assigning managers to slots in Looking Glass, back-home reporting relationships were maintained, so certain level differences were expected. In general, age, number of direct and indirect reports, and level in the hierarchy increased as a manager was assigned to a Plant Manager, Director or top position.

Other than that, the characteristics of Plant Managers and Directors were virtually identical, and markedly different from those of top managers. LGI top managers were older, more experienced, more often male, and came more from administration and less from finance and manufacturing. Sixty percent came from top and upper middle management positions in their real organizations.

³Difference of 10% of managers or more.

Table II-1
Distribution of Functional
Responsibility of LGI Participants

<u>Functional Area</u>	<u>Number of Participants</u>	<u>Percent</u>
Administration	30	17.3
Engineering	18	10.4
Finance	39	22.5
Labor Relations	0	-
Manufacturing	16	9.2
Marketing	6	3.5
Operations	14	8.1
Personnel/Human Resources	29	16.8
Public Relations	3	1.7
Purchasing	2	1.2
Research and Development	8	4.6
Sales	6	3.5
Security	0	-
Other	2	1.2
<hr/>		
Total	173	100%

Table II-2
Sex of LGI Participants

<u>Sex</u>	<u>Number</u>	<u>Percent</u>
Male	148	74.0
Female	52	26.0
<hr/>		
Total	200	100%

Table II-3
Age Distribution for LGI Participants

<u>Age Bracket</u>	<u>Number</u>	<u>Percent</u>
Under 30	50	25.0
31-35	70	35.0
36-40	30	15.0
41-45	17	8.5
46-50	14	7.0
51-55	14	7.0
56-60	5	2.5
<hr/>		
Total	200	100%

Table II-4
Proportion of LGI Participants
Who Were Managers

<u>Classification</u>	<u>Number</u>	<u>Percent</u>
Managers	184	92.0
Non-Managers	16	8.0
<hr/>		
Total	200	100%

Table II-5
 Number of Subordinates
 Reporting Directly
 To the Managers
 Among LGI Participants

<u>Number of Subordinates</u>	<u>Number of LGI Participants²</u>	<u>Percent</u>
0 ¹	19	10.8
1-3	70	39.8
4-6	54	30.7
7-9	19	10.8
10 or more	14	8.0
Total	176	100.1% ³

\bar{x} : 4.22

sd: 3.59

range: 0 to 30

¹Functional managers with no subordinates.

²Twenty-four cases were missing.

³Rounding error.

Table II-6
Direct and Indirect Management
Responsibility of Managers
Among LGI Participants

<u>Number of Direct and Indirect Subordinates</u>	<u>Number of LGI Participants¹</u>	<u>Percent</u>
Less than 10	102	57.0
10-100	65	36.3
101 to 1,000	9	5.0
1001 to 10,000	1	.6
Other	2	1.1
<hr/>		
Total	179	100%

¹Twenty-one cases were missing.

Table II-7
Managerial Experience of LGI Participants

	<u>Participants Who Were Managers</u>
Mean Years as Manager	5.99 ¹
Standard Deviation	5.80
Range	0-30
Mean Years in Present Position	2.52 ²
Standard Deviation	2.39
Range	0-15

¹_n = 175.

²_n = 182.

Table II-8
Management Levels of LGI Participants

<u>Level</u>	<u>Number</u>	<u>% of Total</u>
Top Executives	11	5.5
Upper Middle Managers	44	22.0
Lower Middle Managers	78	39.0
First Level Managers	51	25.5
Non-Managers	16	8.0
Total	200	100%

Table II-9
Banking vs. Manufacturing:
Distribution of Functional Responsibility of Participants

Functional Area	Banking		Manufacturing	
	Number of Participants ¹	Percent	Number of Participants ²	Percent
Administration	22	32.4	3	3.4
Engineering	0	0	18	20.7
Finance	23	33.8	13	14.9
Labor Relations	0	0	0	0
Manufacturing	1	1.5	14	16.1
Marketing	0	0	4	4.6
Operations	8	11.8	6	6.9
Personnel/Human Resources	12	17.6	14	16.1
Public Relations	0	0	3	3.4
Purchasing	0	0	2	2.3
Research and Development	0	0	8	9.2
Sales	1	1.5	1	1.1
Security	0	0	0	0
Other	1	1.5	1	1.1
Total	68	100.1% ³	87	99.8% ³

¹Twelve cases were missing.

²Thirteen cases were missing.

³Rounding error.

Table II-10
Banking vs. Manufacturing:
Sex of Participants

<u>Sex</u>	Banking		Manufacturing	
	<u>Number of Participants</u>	<u>Percent</u>	<u>Number of Participants</u>	<u>Percent</u>
Male	61	76.3	87	87.0
Female	19	23.8	13	13.0
Total	80	100%	100	100%

Table II-11
Banking vs. Manufacturing:
Age Distribution for Participants

<u>Age Bracket</u>	<u>Banking</u>		<u>Manufacturing</u>	
	<u>Number of Participants</u>	<u>Percent</u>	<u>Number of Participants</u>	<u>Percent</u>
Under 30	29	36.3	19	19.0
31-35	28	35.0	35	35.0
36-40	9	11.3	17	17.0
41-45	5	6.3	10	10.0
46-50	4	5.0	7	7.0
51-55	4	5.0	9	9.0
56-60	1	1.3	3	3.0
Total	80	100.2% ¹	100	100%

¹ Rounding error.

Table II-12
 Banking vs. Manufacturing:
 Proportion of Participants
 Who Were Managers

<u>Classification</u>	Banking		Manufacturing	
	<u>Number of Participants</u>	<u>Percent</u>	<u>Number of Participants</u>	<u>Percent</u>
Managers	72	90	93	93
Non-Managers	8	10	7	7
Total	80	100%	100	100%

Table II-13
Banking vs. Manufacturing:
Number of Subordinates Reporting Directly
To the Managers among Participants

Number of Subordinates	Banking		Manufacturing	
	Number of Participants ²	Percent	Number of Participants ³	Percent
0 ¹	7	10.4	11	12.2
1-3	17	25.4	41	45.6
4-6	29	43.3	23	25.6
7-9	11	16.4	8	8.9
10 or more	3	4.5	7	7.8
Total	67	100%	90	100.1% ⁴

¹Functional managers with no subordinates.

²Thirteen cases were missing.

³Ten cases were missing.

⁴Rounding error.

Note: For the category "Banking," $\bar{x} = 4.39$, $sd = 2.72$, range = 0 - 10.
For the category "Manufacturing," $\bar{x} = 3.89$, $sd = 3.20$, range = 0 - 16.

Table II-14
 Banking vs. Manufacturing:
 Direct and Indirect Management Responsibility
 Of Managers among Participants

Number of Direct and Indirect Subordinates	Banking		Manufacturing	
	Number of Participants ¹	Percent	Number of Participants ²	Percent
Less than 10	38	55.1	54	58.2
10 - 100	28	40.6	30	33.0
101 to 1,000	2	2.9	6	6.6
1,001 to 10,000	0	-	1	1.1
Other	1	1.4	1	1.1
Total	69	100%	91	100%

¹Eleven cases were missing.

²Nine cases were missing.

Table II-15
Banking vs. Manufacturing:
Managerial Experience of Participants

	<u>Banking Participants Who Were Managers</u>	<u>Manufacturing Participants Who Were Managers</u>
Mean Years as Manager	7.16 ¹	5.19 ³
Standard Deviation	6.86	4.88
Range	0 - 30	0 - 28
Mean Years in Present Position	2.73 ²	2.36 ⁴
Standard Deviation	2.41	2.43
Range	0 - 15	0 - 15

¹_n = 68.

²_n = 70.

³_n = 89.

⁴_n = 93.

Table II-16
Banking vs. Manufacturing:
Management Levels of Participants

Level	Banking		Manufacturing	
	Number	% of Total	Number	% of Total
Top Executives	3	3.8	2	2.0
Upper Middle Managers	22	27.5	18	18.0
Lower Middle Managers	31	38.8	42	42.0
First Level Managers	16	20.0	31	31.0
Non-Managers	8	10.0	7	7.0
Total	80	100.1% ¹	100	100%

¹ Rounding error.

Table II-17
LGI Level:
Distribution of Functional Responsibility of Participants¹

Functional Area	Level 1		Level 2		Level 3	
	Number of Participants ²	Percent	Number of Participants ³	Percent	Number of Participants ⁴	Percent
Administration	15	39.5	10	13.3	5	8.3
Engineering	4	10.5	6	8.0	8	13.3
Finance	4	10.5	19	25.3	16	26.7
Labor Relations	0	--	0	--	0	--
Manufacturing	0	--	9	12.0	7	11.7
Marketing	1	2.6	4	5.3	1	1.7
Operations	3	7.9	7	9.3	4	6.7
Personnel/Human Resources	4	10.5	14	18.7	11	18.3
Public Relations	2	5.3	1	1.3	0	--
Purchasing	1	2.6	0	--	1	1.7
Research and Development	3	7.9	2	2.7	3	5.0
Sales	1	2.6	2	2.7	3	5.0
Security	0	--	0	--	0	--
Other	-	--	1	1.3	1	1.7
TOTAL	38	100%	75	99.9% ⁵	60	100.1% ⁵

¹Level 1 - President & Vice-Presidents, Level 2 - Directors, Level 3 - Plant Managers.

²Two cases were missing.

³Fifteen cases were missing.

⁴Ten cases were missing.

⁵Rounding error.

Table II-18
LGI Level:
Sex of Participants¹

Sex	Level 1		Level 2		Level 3	
	Number	Percent	Number	Percent	Number	Percent
Male	33	82.5	65	72.2	50	71.4
Female	7	17.5	25	27.8	20	28.6
Total	40	100%	90	100%	70	100%

¹Level 1 - President & Vice-Presidents
Level 2 - Directors
Level 3 - Plant Managers

Table II-19
LGI Level:
Age Distribution for Participants¹

Age Bracket	Level 1		Level 2		Level 3	
	Number	Percent	Number	Percent	Number	Percent
Under 30	1	2.5	25	27.8	24	34.3
31-35	18	45.0	32	35.6	20	28.6
36-40	9	22.5	14	15.6	7	10.0
41-45	4	10.0	8	8.9	5	7.1
46-50	4	10.0	5	5.6	5	7.1
51-55	3	7.5	5	5.6	6	8.6
56-60	1	2.5	1	1.1	3	4.3
Total	40	100%	90	100.2% ²	70	100%

¹Level 1 - President & Vice-Presidents

Level 2 - Directors

Level 3 - Plant Managers

² Rounding error.

Table II-20
LGI Level:
Proportion of Participants Who Were Managers¹

Classification	Level 1		Level 2		Level 3	
	Number	Percent	Number	Percent	Number	Percent
Managers	37	92.5	84	93.3	63	90.0
Non-Managers	3	7.5	6	6.7	7	10.0
Total	40	100%	90	100%	70	100%

¹Level 1 - President & Vice-Presidents
Level 2 - Directors
Level 3 - Plant Managers

Table II-21
Number of Subordinates Reporting Directly to the
Managers among Participants¹

Number of Subordinates	Level 1		Level 2		Level 3	
	Number of LG ¹ Participants	Percent	Number of LG ¹ Participants	Percent	Number of LG ¹ Participants	Percent
0 ²	1	2.8	11	13.6	7	11.9
1-3	10	27.8	29	35.8	31	52.5
4-6	19	52.8	26	32.1	9	15.3
7-9	5	13.9	6	7.4	8	13.6
10 or more	1	2.8	9	11.1	4	6.8
Total	36	100.1% ⁶	81	100%	59	100.1% ⁶

¹Level 1 - President & Vice-Presidents, Level 2 - Directors, Level 3 - Plant Managers.

²Functional managers with no subordinates.

³Four cases were missing.

⁴Nine cases were missing.

⁵Eleven cases were missing.

⁶Rounding error.

Note: For "Level 1," $\bar{x} = 4.47$, $sd = 2.17$, range = 0 - 10.
For "Level 2," $\bar{x} = 4.26$, $sd = 3.22$, range = 0 - 14.
For "Level 3," $\bar{x} = 4.02$, $sd = 4.65$, range = 0 - 30.

Table II-22
LGI Level:
Direct and Indirect Management Responsibility
Of Managers among Participants

Number of Direct and Indirect Subordinates	Level 1		Level 2		Level 3	
	Number of LGI ¹ Participants ²	Percent	Number of LGI ³ Participants ³	Percent	Number of LGI ⁴ Participants ⁴	Percent
Less than 10	16	43.2	44	53.0	42	71.2
10 to 100	19	51.4	33	39.8	13	22.0
101 to 1,000	2	5.4	4	4.8	3	5.1
1,001 to 10,000	0	-	0	-	1	1.7
Other	-	-	2	2.4	-	-
Total	37	100%	83	100%	59	100%

¹Level 1 - President & Vice-Presidents, Level 2 - Directors, Level 3 - Plant Managers.

²Three cases were missing.

³Seven cases were missing.

⁴Eleven cases were missing.

Table II-23
Managerial Experience of Participants¹

	Level 1 Participants Who Were Managers	Level 2 Participants Who Were Managers	Level 3 Participants Who Were Managers
Mean Years as Manager	8.88 ²	5.29 ⁴	5.10 ⁶
Standard Deviation	6.94	5.44	4.93
Range	0-27	0-30	0-20
Mean Years In Present Position	3.19 ³	2.08 ⁵	2.72 ⁷
Standard Deviation	2.73	1.65	2.90
Range	.5-15.0	0-10	0-15

¹Level 1 - President & Vice-Presidents, Level 2 - Directors, Level 3 - Plant Managers.

²n = 37.

⁴n = 80.

⁶n = 58.

³n = 36.

⁵n = 84.

⁷n = 62.

Table II-24
LGI Level:
Management Levels of Participants¹

Level	Level 1		Level 2		Level 3	
	Number	Percent	Number	Percent	Number	Percent
Top Executives	5	12.5	5	5.6	1	1.4
Upper Middle Managers	19	47.5	21	23.3	4	5.7
Lower Middle Managers	10	25.0	37	41.1	31	44.3
First Level Managers	3	7.5	21	23.3	27	38.6
Non-Managers	3	7.5	6	6.7	7	10.0
Total	40	100%	90	100%	70	100%

¹Level 1 - President & Vice-Presidents
Level 2 - Directors
Level 3 - Plant Managers

III. ACTIVITY PATTERNS

Introduction

How do the managers in Looking Glass spend their time? Since LGI is intended to simulate managerial work, there should be some resemblance between the ways LGI managers allocate their time and results of studies done on managers in real organizations. Drawing heavily on diary and observational studies of managers (reviewed in McCall, Morrison, and Hannan, 1978), a form and procedures were designed for use with Looking Glass. Field studies have varied dramatically in definitions of activities and in procedures used to collect the data. In designing the LGI time sample strategy, a simple classification scheme focused on what, where, and with whom was chosen as the most feasible approximation to previous studies. The specific categories are shown on the time sample form (Figure III-1).

The operational definitions of the categories were as follows:

What?

paperwork - reading, writing, thinking, shuffling papers, etc.

telephone - engaged in conversation over the phone

meeting - in conversation with one or more other people

other - walking around, waiting to see someone, getting coffee, etc.

Where?

own office - activity took place in the target person's assigned office space

other's office - activity took place in another participant's office

conference room - activity took place in the designated conference area

other - someplace else, for example in the halls or cafeteria.

With whom?

subordinates - people who report to the target person (The Directors of Product Development and Sales and Marketing and the Plant Managers have no subordinates present during the simulation. They were not counted in these tallies).

superiors - boss of the target person (only the Presidents have no superior during the simulation)

colleagues - managers who report to the same boss

fellow specialists - managers who perform similar functions in different divisions of the organization.

In each run of Looking Glass two trained observers were assigned to collect time sample data. Each observer watched each of the twenty managers for at least one ten minute period. The sequence of observations for the observers was randomly decided prior to each run.

Time sampling began after the initial 45-minute period that managers spent reviewing their in-baskets. It continued until the President's address, but did not include the 45-minute lunch break. These procedures resulted in a minimum of 400 minutes of direct observation during each run (two observers x 20 participants x 10 minutes per observation period). In cases where an observer completed all twenty observations prior to the President's address, additional random observations were made.

To calculate the estimated percentage of time spent in a given activity, the total amount of time spent on that activity was divided by the total time of observation. For example, percent of time spent on paperwork would be calculated by summing the total number of minutes managers were observed doing paperwork and dividing by the total number of minutes of observation (then multiplying by 100 to convert to a percentage).

The data presented in this section include overall percentages (based on all twenty managers in all ten runs), activity profiles based on division of LGI, and bank vs. manufacturing and LGI level splits. Obviously, the more minutes of observation, the more accurate the estimates.

Simulation is by definition different from the real thing. In considering the time data, several possible artifacts must be considered:

1) The participants in LGI have not worked for the company before. Lack of familiarity is likely to result in more time spent going over in-basket materials than a real manager would spend, with a corresponding decrease in time spent in interaction.

2) There are only twenty live roles in LGI. Managers' interactions (except by phone and memo) are therefore limited to the other managers present. This obviously eliminates meetings with outsiders and non-live LGI staff and inflates time spent with subordinates, superiors, and colleagues.

3) In all LGI runs, numerous meetings were held during the lunch period. Since no time samples were collected then, the total time spent in meetings is likely to be lower than it really was.

In addition to the time sample, data were collected on the number of memos written in LGI. The results are reported in the last table of this section.

EPISODE	DURATION	TITLE		DIVISION	OBSERVER	START	STOP	TOPIC(S)																									
		WHAT	WHERE																														
									WITH WHOM																								
1		PAPERWORK	OWN DESK	APD	VP	DIR-MFG	DIR-S&M	DIR-PD	PM-OF	PM-IC	PM-CAP	VP	DIR-MFG	DIR-S&M	DIR-PD	IGD	PM-AUTO	PM-SPEC	VP	DIR-MFG	DIR-S&M	DIR-PD	PM-FLAT	PM-LIGHT	OUTSIDER	UNKNOWN	ALONE	SELF	SUPERIOR	PEER	SUBORDINATE	OTHER	UNKNOWN
2																																	
3																																	
4																																	
5																																	
6																																	
7																																	
8																																	
9																																	
10																																	
11																																	
12																																	

Figure III-1

HIGHLIGHTS

Time Spent on Various Activities (Table III-1)

Table III-1 compares the means and ranges of time allocation in LGI with the range of means from five different studies of managers in real organizations. Given the limitations of simulation, the results are surprisingly close. The largest disparities are that LGI managers spend more time on paperwork, more time in their own offices, and more time with superiors and colleagues.

One of the major concerns is the amount of time spent on paperwork (38.3-52.5% in LGI, 22-36% in field studies). In fact, it is surprising that even more time isn't spent on paperwork because 1) the managers are unfamiliar with the company and would be expected to spend more time getting familiar with the material in the in-baskets; 2) in each run, thirteen managers have none of their subordinates present and therefore communicate with them by phone or memo; 3) time samples were not collected during lunch, a time almost always filled with meetings (including this would have reduced the percentage of time in paperwork and increased time in meetings); 4) there were no secretaries to pre-sort in-baskets, to take dictation, or type memos (this may be the most important single factor); and 5) there are fewer people to meet with in LGI -- no outsiders, none of the corporate staff, etc.

These same factors seem adequate to explain the other disparities. One would expect less time in meetings in LGI because there are fewer people to meet with. More time in their own offices probably reflects the absence of outside travel - the diary and observational studies sampled over a period of weeks while our replications were restricted to a day "at the office."

In summary, LGI managers spend their time much like managers in real organizations. Disparities that do result are interpretable in light of the inherent limitations of simulation. In the typical LGI run, the average manager will spend more than half the time in conversation (either face-to-face or on the phone), and a majority of the time in the office. For those LGI managers with subordinates present, about a third of the time will be spent with them. About a quarter of the time will be spent with supervisors and/or colleagues.

Divisional Comparisons (Table III-2)

Mintzberg (1973) and Kurke and Aldrich (1979) hypothesize and partially support the idea that more dynamic environments increase managers' orientations to live action and oral media. Table III-3 shows some tendency for APD (the division with the most volatile environment) to follow that pattern: less time on paperwork, more time in meetings, and less time in their own offices.

While APD and CGD are similar, IGD is markedly different in all three categories (what, where, and with whom). At the present time we cannot tell if this is a simulation artifact or a reflection of the impact of IGD's schizophrenic environment (see McCall and Lombardo, 1978). IGD typically operates in a top-down fashion, and these data clearly reflect a "bureaucratic" pattern. The questions raised by these results will be considered in future research.

Banking versus Manufacturing (Table III-3)

In general, managers from banking and manufacturing organizations spent their time in LGI in similar ways. There is a tendency for manufacturing groups to spend slightly more time on paperwork, in their offices, and with subordinates. In Section II it was shown that the manufacturing sample contained more lower level managers than the bank sample, so these results may reflect level effects.

The most striking difference between the two samples is not in the means, but in the standard deviations. There has been considerably less variance across runs for manufacturing managers--even though two different manufacturing concerns were represented and only one bank.

LGI Level (Table III-4)

McCall et al (1978) noted that a manager's level affects his or her activity patterns. This is true in the simulation, where upper level LGI managers spent less time on paperwork and more time in conversation. In fact, LGI's top executives' profile is the closest to the comparative data reported in Table III-1. Because LGI is a top management simulation, these results are encouraging.

Mail Records (Table III-5)

Certainly part of the time spent on paperwork is devoted to writing memos. Table III-5 reports the average number of memos written by LGI managers. Overall, the average number of memos (excluding copies) for a typical LGI manager is 7.7. This average varies from 4.0 to 12.5, depending on the run. As expected the volatile division's managers (APD) wrote fewer memos than managers in the stable division (CGD).

Mintzberg (1973) found that the top executives he studied wrote an average of 9.2 memos and letters on a typical day. If the average for LGI is extrapolated to an eight hour day (LGI is only six hours long), LGI managers average 9.6 pieces.

Summary

While there are differences in activity patterns between LGI and field study results, the overall pattern is probably as close as could be hoped for in a simulated environment. Especially for the top positions in LGI, the match is incredibly close.

Table III-1
Time Spent by Looking Glass Managers
On Various Activities¹

<u>Activity</u>	<u>Total Minutes Observed</u>	<u>Average % of Time Spent per Run</u>	<u>Standard Deviation Across Runs</u>	<u>LGI² Range</u>	<u>Comparative Base Range³</u>
<u>What?</u>					
Paperwork	2094.2	46.3%	5.3	38.3-52.5%	22-36%
Telephone	453.3	10.1%	3.8	6.0-17.2%	6-17%
Meetings	1839.4	40.5%	6.6	29.1-52.7%	36-69%
Other	141.2	3.1%	0.8	1.8- 4.3%	3-13%
<u>Where?</u>					
Own Office	2984.4	68.2%	6.9	58.0-76.9%	39-52%
Other's Office	846.5	19.4%	6.9	6.7-28.1%	(16%)
Conference Room	439.5	10.0%	10.0	0 -32.4%	14-33%
Other	107.4	2.4%	1.1	0.9- 3.8%	-
<u>With Whom?⁴</u>					
Subordinates ⁵	541.7	34.1%	8.4	19.8-46.9%	26-37%
Superiors	1052.9	24.2%	5.5	18.1-35.9%	5-13%
Colleagues ⁶	1097.0	25.3%	7.5	16.1-40.1%	(12%)
Fellow Specialf	111.1	3.0%	1.8	0.4- 5.9%	(8%)

¹Based on 10 Runs of LGI.

²Range of means from Table III-2.

³Range of means from diary or observational studies by Stewart (1967), Horne and Lupton (1965), Mintzberg, Choran, and Kurke and Aldrich (the last three reported in Kurke and Aldrich, 1979). Numbers in parentheses indicate that only one of the five studies reported those data.

⁴"With whom" percentages exceed 100% because a participant could meet with more than one person at once.

⁵Only managers with "live" subordinates were counted.

⁶Managers reporting to the same boss.

⁷Managers performing the same function but in different divisions.

Table III-2
Percent of Time Spent on Various Activities
Divisional Comparisons¹

<u>Activity</u>	<u>Division²</u>		<u>IGD</u>	<u>LGI Overall</u>
	<u>APD</u>	<u>CGD</u>		
What?				
Paperwork	41.4%	42.5%	56.0%	46.3%
Telephone	10.0%	11.5%	9.9%	10.0%
Meetings	45.6%	41.9%	32.5%	40.6%
Other	3.1%	4.2%	1.7%	3.2%
Where?				
Own Office	61.1%	66.8%	75.2%	68.2%
Other's Office	24.1%	20.1%	15.4%	19.3%
Conference Room	13.1%	9.9%	7.4%	10.0%
Other	1.8%	3.2%	2.0%	2.4%
With Whom? ³				
Subordinates ⁴	33.8%	32.2%	29.2%	33.8%
Supervisors ⁵	32.5%	22.9%	15.8%	24.4%
Colleagues ⁵	30.9%	29.1%	14.9%	25.4%
Fellow Specialists ⁶	3.2%	3.9%	2.1%	3.1%

¹For computation of these percentages, all observations for each division were summed across the ten runs. LGI overall percentages vary slightly from those reported in table III-1.

²APD has seven members, IGD and CGD six each. The Presidents' observations are included in LGI overall.

³"With Whom" percentages exceed 100% because a participant could meet with more than one person at once.

⁴Only managers with "live" subordinates were counted.

⁵Managers reporting to the same boss.

⁶Managers performing the same function but in different divisions.

Table III-3
Banking vs. Manufacturing:
Time Spent on Various Activities¹

<u>Activity</u>		<u>Total Minutes Observed</u>	<u>Average % of Time Spent Per Run</u>	<u>Standard Deviation Across Runs</u>
What?				
Paperwork	Bank	802.3	44.3%	6.0
	MFG	1117.5	49.5%	1.5
Telephone	Bank	216.8	12.1%	5.2
	MFG	209.3	9.3%	1.8
Meetings	Bank	733.5	40.2%	8.4
	MFG	865.9	38.3%	1.8
Other	Bank	61.2	3.4%	0.7
	MFG	66.0	2.9%	1.0
Where?				
Own Office	Bank	1137.8	64.3%	8.5
	MFG	1572.6	72.6%	2.2
Other's Office	Bank	243.6	13.8%	7.0
	MFG	490.2	22.5%	4.0
Conf. Room	Bank	336.3	18.8%	9.4
	MFG	67.2	3.3%	5.0
Other	Bank	55.7	3.1%	0.8
	MFG	35.1	1.6%	0.8
With Whom? ²				
Subordinates ³	Bank	201.4	32.8%	10.2
	MFG	288.3	36.1%	8.3
Superiors	Bank	489.2	27.8%	7.4
	MFG	460.2	21.4%	1.5
Colleagues ⁴	Bank	464.4	26.4%	6.7
	MFG	461.5	21.4%	4.3
Fellow Specialists ⁵	Bank	58.6	3.9%	1.9
	MFG	43.9	2.4%	1.8

¹There were four bank runs, five manufacturing.

²"With Whom" percentages exceed 100% because a participant could meet with more than one person at once.

³Only managers with "live" subordinates were counted.

⁴Managers reporting to the same boss.

⁵Managers performing the same function but in different divisions.

Table III-4
LGI Level:
Time Spent on Various Activities¹

Activity	Percent of Time Spent by:		
	Level 1 ²	Level 2	Level 3
What?			
Paperwork	34.8%	44.1%	55.5%
Telephone	5.9%	11.9%	10.1%
Meetings	55.5%	40.7%	32.1%
Other	3.9%	3.4%	2.4%
	(925.6) ³	(1995.4)	(1607.1)
Where?			
Own Office	62.2%	68.8%	70.8%
Other's Office	26.4%	16.5%	18.9%
Conference Room	6.9%	12.2%	9.1%
Other	4.5%	2.5%	1.3%
	(885.4)	(1916.7)	(1574.8)
With Whom? ⁴			
Subordinates ⁵	31.7%	36.7%	-
Supervisors	32.7%	21.9%	23.9%
Colleagues ⁶	24.7%	29.5%	20.6%
Fellow Specialists ⁷	-	2.1%	4.3%
	(692.1)	(1317.0)	(793.6)%

¹Based on total minutes observed in all runs.

²Level 1 - Presidents & Vice-Presidents, Level 2 - Directors,
Level 3 - Plant Managers.

³Total number of minutes observed appear in parentheses.

⁴"With Whom" percentages exceed 100% because a participant could meet
with more than one person at once.

⁵Only managers with "live" subordinates were counted.

⁶Managers reporting to the same boss.

⁷Managers performing the same function but in different divisions.

Table III-5
Mail Records

	<u>PRES</u>	Memos Written By:			
		<u>Managers in APD</u>	<u>Managers in CGD</u>	<u>Managers in IGD</u>	<u>All Managers</u>
Average Number of Memos Written ¹	9.5	7.5	8.0	7.3	7.7
Range of Averages for Runs	6-21	4.0-12.4	4.7-11.2	4.2-12.5	4.0-12.5
Sample	10	70	60	60	200

¹Copies of memos not included.

IV. ORGANIZATIONAL CLIMATE

Introduction

Organizations have an elusive quality usually called personality or climate--perceptions of its practices, policies and leadership styles as seen by its members. To differentiate it from job satisfaction, climate measures focus on the description of attributes while satisfaction measures ask how one feels about those attributes.

After each run of Looking Glass, we collected managers' perceptions of climate by having them complete a shortened version of the Survey of Organizations¹ which is a standardized questionnaire that measures organizational climate, leadership, peer behavior, group processes, and satisfaction.

The scales we used were peer leadership, supervisory leadership, and organizational climate.² (The Presidents received a slightly different version since they described the company rather than a division.) Each item was rated on a five point scale (to a very little extent. . . to a very great extent). The resulting data are reported by scale, by division, and by level.

¹ Adapted with permission from the Survey of Organizations ©1974, the University of Michigan (Taylor, J. C. & Bowers, D. G., Survey of Organizations. Ann Arbor, MI: University of Michigan, Institute for Social Research, 1972).

² Peer leadership was used intact. In both supervisory leadership and organizational climate, we omitted 3 items because they were not relevant to the simulation.

Survey of Organizations
Scales & Subscales Used
in the Looking Glass Project

PEER LEADERSHIP & SUPERVISORY LEADERSHIP

Consisted of the following subscales:

- | | | |
|--------------------------|---|---|
| Support | - | friendliness, paying attention to you, listening to your problems |
| Goal Emphasis | - | encouragement to give best effort, high standards of performance |
| Work Facilitation | - | help in work methods, planning, organizing & solving problems |
| Interaction Facilitation | - | team emphasis, team goal & exchanging ideas |

ORGANIZATIONAL CLIMATE

Consisted of the following subscales:

- | | | |
|---------------------------|---|---|
| Human Resources Primacy | - | general concern for welfare, working conditions, organization of work activities |
| Communication Flow | - | upward, downward, & lateral communication |
| Decision-Making Practices | - | information-sharing, decisions made at right levels, involvement of those affected by decisions |
| Motivational Conditions | - | handling of differences & disagreements |

HIGHLIGHTS

Psychometric Comparison (Table IV-1)

Although the reporting varies in the Survey of Organizations manual from the methods we used, some comparisons may be made. In general, the intercorrelations between the subscales in our sample are lower than those found in SO research. This difference is at least partially due to the lower internal consistency of our subscales.

Perhaps the fairest tests of comparability are:

- 1) What are the internal consistencies of the three major scales as compared to the SO?
- 2) Do the subscales cluster in the same pattern as they did in the SO analysis?

Here the data are clear. 1) The internal consistency coefficients for peer and supervisory leadership and organizational climate in our sample are virtually identical to the median coefficients for the same scales on the SO. 2) The subscales also show a consistent relationship to the three overall scales. For example, the peer leadership subscales correlate highly with the peer leadership scale, and less highly with supervisory leadership and organizational climate. This indicates that our scales are similar to those of the SO.

In sum, for the purposes of normative description, the SO and Looking Glass data are sufficiently similar to allow use of the SO norm tables for middle managers in examining the LGI results from the peer and supervisory leadership, and organizational climate scales.

Overall Scales (Tables IV-2 - IV-4)

On the whole, Looking Glass is a typical organization. Eight of the twelve subscales fall within the averages reported for middle managers by the SO. Peer support fell slightly above average (70 percentile) and human resources primacy, supervisory goal emphasis and work facilitation slightly below average (the 20-30 percentile range).

These findings may mean that in a six-hour simulation, most of the activity occurs within divisions. Descriptions of co-workers are likely to be more positive than descriptions of supervisors, who have little time to provide direction; or the organization, which has little time to form an identity. These findings represent only the slightest of tendencies; the grand means for the scales describe Looking Glass as a 50th percentile organization.

The scales with the most variance were the interaction facilitation measures, reflecting the varying amounts of team emphasis that occurred across the runs.

Divisional Comparisons (Tables IV-5 - IV-7)

The most powerful division, APD, was the most positive about the concern the organization showed for its people, and the organization's "milk cow", CGD, (see V) was least positive. CGD also reported the least support from its bosses and IGD the least encouragement from its bosses and peers to work as a team. The remaining divisional comparisons showed no large differences.

The Presidents saw relationships as somewhat rosier than did the divisions, rating peer goal emphasis, work and interaction facilitation in a more positive light. They also reported more concern for the welfare of employees and were more often positive about the decision-making practices and handling of disagreements than were the divisions. The only scale where Presidents were less positive was communications flow, indicating some need for more and/or different kinds of information.

Banking and Manufacturing Managers (Tables IV-8 - IV-13)

Banking managers were higher on eleven of the twelve subscales indicating they saw the overall climate and leadership of Looking Glass more positively than manufacturing managers did.

Level Differences (Tables IV-14 - IV-16)

Although there was a slight trend for peer leadership ratings to increase as level did, different levels in Looking Glass basically perceived the climate in the same way.

Table IV-1
 Convergent and Discriminant Validity
 Of Survey of Organizations Subscales:
 LGI Shortened Version

	Peer Leadership (.84) ¹	Organizational Climate (.77)	Supervisory Leadership (.87)
Peer Support (.68)	.66	.31	.38
Peer Goal Emphasis (.53)	.78	.38	.31
Peer Work Facilitation (.68)	.80	.45	.39
Peer Interaction Facilitation (.79)	.80	.35	.42
Human Resources Primacy (.68)	.37	.70	.40
Communication Flow (.56)	.37	.75	.42
Decision Making (.71)	.39	.80	.35
Motivational Conditions ²	.32	.48	.28
Supervisory Support (.87)	.28	.40	.73
Supervisory Goal Emphasis (.69)	.55	.41	.78
Supervisory Work Facilitation (.76)	.37	.46	.84
Supervisory Interaction Facilitation (.86)	.38	.29	.74

¹(.xx) are alpha coefficients.

²Only one item from this subscale was appropriate to LGI.

Table IV-2
Peer Leadership

<u>Scale</u>	<u>Mean</u> ¹	<u>Standard Deviation</u>	<u>Range</u>	<u>N</u>
Peer Support	4.18	.13	3.95-4.33	10
Peer Goal Emphasis	3.53	.23	3.13-3.95	10
Peer Work Facilitation	3.31	.24	3.03-3.77	10
Peer Interaction Facilitation	3.43	.31	3.10-4.10	10
Peer Leadership	3.62	.20	3.37-4.05	10

¹Rated on a five point scale: 1 = to a very little extent; 2 = to a little extent; 3 = to some extent; 4 = to a great extent; 5 = to a very great extent.

Table IV-3
Organizational Climate¹

<u>Scale</u>	<u>Mean</u>	<u>Standard Deviation</u>	<u>Range</u>	<u>N</u>
Human Resources Primacy	3.09	.18	2.72-3.30	10
Communication Flow	3.18	.18	2.95-3.47	10
Decision Making Practices	3.33	.19	3.05-3.57	10
Motivational Conditions	3.59	.27	3.15-3.89	10
Organizational Climate	3.24	.16	2.96-3.43	10

¹Rated on a five point scale: 1 = to a very little extent; 2 = to a little extent; 3 = to some extent; 4 = to a great extent; 5 = to a very great extent.

Table IV-4
Supervisory Leadership¹

<u>Scale</u>	<u>Mean</u>	<u>Standard Deviation</u>	<u>Range</u>	<u>N</u>
Supervisory Support	4.14	.19	3.75-4.40	10
Supervisory Goal Emphasis	3.62	.24	3.34-4.08	10
Supervisory Work Facilitation	2.71	.26	2.22-2.94	10
Supervisory Interaction Facilitation	3.35	.40	2.45-3.87	10
Supervisory Leadership	3.44	.24	2.91-3.67	10

¹Rated on a five point scale: 1 = to a very little extent; 2 = to a little extent; 3 = to some extent; 4 = to a great extent; 5 = to a very great extent.

Table IV-5
Peer Leadership - By Division¹

Scale	APD		CGD		IGD		PRESIDENT	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Peer Support	4.22	.14	4.13	.21	4.17	.24	4.20	.36
Peer Goal Emphasis	3.55	.13	3.54	.22	3.44	.50	3.94	.46
Peer Work Facilitation	3.35	.29	3.28	.25	3.23	.37	3.70	.46
Peer Interaction Facilitation	3.48	.31	3.66	.44	3.10	.45	3.70	.84
Peer Leadership	3.66	.19	3.66	.20	3.50	.35	3.85	.40

¹Rated on a five point scale: 1 = to a very little extent; 2 = to a little extent; 3 = to some extent
4 = to a great extent; 5 = to a very great extent. Based on ten runs.

Table IV-6
Organizational Climate - By Division¹

Scale	APD		CGD		IGD		PRESIDENT	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Human Resources Primacy	3.28	.33	2.91	.36	3.00	.24	3.30	.69
Communication Flow	3.22	.22	3.06	.34	3.24	.31	3.00	-
Decision Making Practices	3.39	.33	3.22	.32	3.31	.20	3.73	.60
Motivational Conditions	3.55	.46	3.56	.45	3.61	.38	3.88	1.25
Organizational Climate	3.32	.24	3.12	.26	3.24	.21	-	-

¹Rated on a five point scale: 1 = to a very little extent; 2 = to a little extent; 3 = to some extent; 4 = to a great extent; 5 = to a very great extent. Based on ten runs.

Table IV-7
Supervisory Leadership - By Division¹

Scale	APD		CGD		IGD	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Supervisory Support	4.26	.18	3.98	.44	4.16	.23
Supervisory Goal Emphasis	3.74	.20	3.57	.53	3.51	.38
Supervisory Work Facilitation	2.75	.39	2.66	.40	2.69	.40
Supervisory Interaction Facilitation	3.51	.40	3.54	.65	2.97	.49
Supervisory Leadership	3.55	.25	3.41	.46	3.35	.26

¹Rated on a five point scale: 1 = to a very little extent; 2 = to a little extent; 3 = to some extent; 4 = to a great extent; 5 = to a very great extent. Based on ten runs.

Table IV-8
Bank vs. Manufacturing:
Peer Leadership¹

<u>Scale</u>	<u>Mean</u>	<u>Standard Deviation</u>	<u>Range</u>	<u>N</u>
Peer Support				
Bank	4.25	.08	4.15-4.33	4
MFG	4.09	.12	3.95-4.23	5
Peer Goal Emphasis				
Bank	3.62	.07	3.55-3.71	4
MFG	3.37	.18	3.13-3.56	5
Peer Work Facilitation				
Bank	3.39	.19	3.12-3.55	4
MFG	3.17	.14	3.03-3.40	5
Peer Interaction Facilitation				
Bank	3.52	.15	3.38-3.70	4
MFG	3.22	.15	3.10-3.48	5
Peer Leadership				
Bank	3.69	.10	3.57-3.82	4
MFG	3.48	.09	3.37-3.56	5

¹Rated on a five point scale: 1 = to a very little extent; 2 = to a little extent; 3 = to some extent; 4 = to a great extent; 5 = to a very great extent.

Table IV-9
Bank vs. Manufacturing;
Organizational Climate¹

<u>Scale</u>	<u>Mean</u>	<u>Standard Deviation</u>	<u>Range</u>	<u>N</u>
Human Resources				
Primacy				
Bank	3.20	.09	3.10-3.30	4
MFG	2.99	.19	2.72-3.23	5
Communications Flow				
Bank	3.30	.15	3.12-3.47	4
MFG	3.13	.16	2.95-3.35	5
Decision Making Practices				
Bank	3.48	.02	3.46-3.50	4
MFG	3.24	.21	3.05-3.57	5
Motivational Conditions				
Bank	3.55	.33	3.15-3.89	4
MFG	3.56	.24	3.20-3.83	5
Organizational Climate				
Bank	3.35	.05	3.31-3.41	4
MFG	3.17	.18	2.96-3.43	5

¹Rated on a five point scale: 1 = to a very little extent; 2 = to a little extent; 3 = to some extent; 4 = to a great extent; 5 = to a very great extent.

Table IV-10
Bank vs. Manufacturing;
Supervisory Leadership¹

<u>Scale</u>	<u>Mean</u>	<u>Standard Deviation</u>	<u>Range</u>	<u>N</u>
Supervisory Support				
Bank	4.17	.11	4.09-4.32	4
MFG	4.11	.27	3.75-4.40	5
Supervisory Goal Emphasis				
Bank	3.70	.15	3.56-3.84	4
MFG	3.46	.14	3.34-3.68	5
Supervisory Work Facilitation				
Bank	2.91	.04	2.86-2.94	4
MFG	2.51	.24	2.22-2.75	5
Supervisory Interaction Facilitation				
Bank	3.57	.27	3.22-3.87	4
MFG	3.11	.40	2.45-3.50	5
Supervisory Leadership				
Bank	3.58	.10	3.46-3.67	4
MFG	3.29	.25	2.91-3.53	5

¹Rated on a five point scale: 1 = to a very little extent; 2 = to a little extent; 3 = to some extent; 4 = to a great extent; 5 = to a very great extent.

Table IV-11
Bank vs. Manufacturing:
Peer Leadership - By Division¹

<u>Scale</u>	APD		CGD		IGD		PRESIDENT	
	<u>Mean</u>	<u>Standard Deviation</u>	<u>Mean</u>	<u>Standard Deviation</u>	<u>Mean</u>	<u>Standard Deviation</u>	<u>Mean</u>	<u>Standard Deviation</u>
Peer Support								
Bank	4.21	.06	4.24	.18	4.32	.12	4.08	.17
MFG	4.23	.19	4.02	.20	3.98	.13	4.20	.45
Peer Goal Emphasis								
Bank	3.59	.09	3.63	.14	3.60	.13	4.00	0
MFG	3.50	.16	3.41	.21	3.13	.45	3.80	.57
Peer Work Facilitation								
Bank	3.45	.32	3.36	.24	3.24	.27	3.83	.19
MFG	3.20	.21	3.15	.20	3.10	.35	3.47	.51
Peer Interaction Facilitation								
Bank	3.47	.17	3.75	.31	3.26	.33	4.08	.74
MFG	3.33	.21	3.48	.50	2.83	.39	3.13	.45
Peer Leadership								
Bank	3.69	.18	3.75	.14	3.61	.16	3.94	.28
MFG	3.58	.15	3.54	.13	3.30	.31	3.64	.26

¹ Rated on a five point scale: 1 = to a very little extent; 2 = to a little extent; 3 = to some extent; 4 = to a great extent; 5 = to a very great extent. Based on four banking and five manufacturing runs.

Table IV-12
Bank vs. Manufacturing:
Organizational Climate - By Division¹

Scale	APD		CGD		IGD		PRESIDENT	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Human Resources Primacy								
Bank	3.36	.22	3.07	.34	3.11	.23	3.33	.27
MFG	3.13	.35	2.88	.32	2.92	.27	3.00	.67
Communication Flow								
Bank	3.35	.30	3.19	.39	3.35	.35	3.00	-
MFG	3.17	.12	2.98	.35	3.21	.32	-	-
Decision Making Practices								
Bank	3.61	.15	3.39	.19	3.40	.23	3.58	.42
MFG	3.25	.38	3.11	.39	3.30	.14	3.67	.67
Motivational Conditions								
Bank	3.43	.48	3.71	.53	3.59	.39	3.00	1.73
MFG	3.60	.53	3.38	.40	3.59	.45	4.25	.50
Organizational Climate								
Bank	3.43	.19	3.28	.22	3.31	.24	-	-
MFG	3.22	.28	3.04	.26	3.22	.20	-	-

¹Rated on a five point scale: 1 = to a very little extent; 2 = to a little extent; 3 = to some extent; 4 = to a great extent; 5 = to a very great extent. Based on four banking and five manufacturing runs.

Table IV-13
Bank vs. Manufacturing:
Supervisory Leadership - By Division¹

Scale	APD		CGD		IGD	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Supervisory Support						
Bank	4.30	.12	4.03	.32	4.17	.16
MFG	4.23	.25	3.89	.58	4.20	.28
Supervisory Goal Emphasis						
Bank	3.84	.14	3.60	.44	3.60	.30
MFG	3.61	.18	3.40	.58	3.33	.39
Supervisory Work Facilitation						
Bank	2.94	.26	2.81	.13	2.97	.43
MFG	2.50	.33	2.49	.51	2.53	.29
Supervisory Interaction Facilitation						
Bank	3.59	.24	3.72	.63	3.38	.44
MFG	3.31	.39	3.28	.68	2.70	.36
Supervisory Leadership						
Bank	3.66	.12	3.51	.33	3.54	.31
MFG	3.40	.26	3.25	.57	3.23	.16

¹Rated on a five point scale: 1 = to a very little extent; 2 = to a little extent; 3 = to some extent; 4 = to a great extent; 5 = to a very great extent. Based on four banking and five manufacturing runs.

Table IV-14
LGI Level:
Peer Leadership¹

<u>Scale</u> ²	<u>Mean</u>	<u>Standard Deviation</u>	<u>Range</u>	<u>N</u>
Peer Support				
Level 1	4.18	.43	3.33-5.00	40
Level 2	4.17	.55	2.33-5.00	90
Level 3	4.18	.51	2.33-5.00	70
Peer Goal Emphasis				
Level 1	3.59	.68	2.00-5.00	38
Level 2	3.54	.74	1.50-5.00	90
Level 3	3.48	.77	1.00-5.00	68
Peer Work Facilitation				
Level 1	3.55	.62	1.67-4.67	39
Level 2	3.30	.81	1.00-5.00	90
Level 3	3.21	.74	1.67-5.00	68
Peer Interaction Facilitation				
Level 1	3.59	.71	2.33-5.00	40
Level 2	3.55	.84	1.33-5.00	89
Level 3	3.18	.91	1.00-5.00	70
Peer Leadership				
Level 1	3.73	.40	2.73-4.73	37
Level 2	3.65	.57	2.18-5.00	89
Level 3	3.52	.58	1.73-4.91	67

¹Rated on a five point scale: 1 = to a very little extent; 2 = to a little extent; 3 = to some extent; 4 = to a great extent; 5 = to a very great extent.

²Level 1 - President & Vice-Presidents, Level 2 - Directors,
Level 3 - Plant Managers.

Table IV-15
LGI Level:
Organizational Climate¹

<u>Scale</u> ²	<u>Mean</u>	<u>Standard Deviation</u>	<u>Range</u>	<u>N</u>
Human Resources Primacy				
Level 1	3.04	.65	1.67-4.67	39
Level 2	2.93	.83	1.00-4.67	89
Level 3	3.31	.58	1.67-5.00	70
Communication Flow				
Level 1	3.10	.65	2.00-4.33	31
Level 2	3.17	.64	1.33-4.67	90
Level 3	3.22	.67	1.33-5.00	69
Decision Making Practices				
Level 1	3.57	.65	2.00-4.67	40
Level 2	3.34	.72	1.33-4.67	89
Level 3	3.18	.70	1.33-4.67	69
Motivational Conditions				
Level 1	3.73	.90	1.00-5.00	37
Level 2	3.54	1.13	1.00-5.00	89
Level 3	3.56	.94	1.00-5.00	68
Organizational Climate				
Level 1	3.28	.52	2.00-4.20	28
Level 2	3.20	.57	1.60-4.50	87
Level 3	3.26	.46	2.40-4.30	66

¹Rated on a five point scale: 1 = to a very little extent; 2 = to a little extent; 3 = to some extent; 4 = to a great extent; 5 = to a very great extent.

²Level 1 - President & Vice-Presidents, Level 2 - Directors,
Level 3 - Plant Managers.

Table IV-16
LGI Level:
Supervisory Leadership¹

<u>Scale</u> ²	<u>Mean</u>	<u>Standard Deviation</u>	<u>Range</u>	<u>N</u>
Supervisory Support				
Level 1	3.97	.85	2.00-5.00	30
Level 2	4.14	.72	1.00-5.00	90
Level 3	4.21	.57	3.00-5.00	70
Supervisory Goal Emphasis				
Level 1	3.70	.82	2.50-5.00	30
Level 2	3.54	.86	1.00-5.00	89
Level 3	3.67	.74	1.00-5.00	70
Supervisory Work Facilitation				
Level 1	2.54	.90	1.00-3.67	30
Level 2	2.69	.81	1.00-4.33	89
Level 3	2.81	.82	1.00-4.33	69
Supervisory Interaction Facilitation				
Level 1	3.55	1.25	1.00-5.00	29
Level 2	3.48	.94	1.00-5.00	89
Level 3	3.11	.98	1.00-5.00	70
Supervisory Leadership				
Level 1	3.41	.74	1.60-4.50	29
Level 2	3.45	.65	1.40-4.80	89
Level 3	3.45	.59	2.20-4.60	69

¹Rated on a five point scale: 1 = to a very little extent; 2 = to a little extent; 3 = to some extent; 4 = to a great extent; 5 = to a very great extent.

²Level 1 - Vice-Presidents, Level 2 - Directors, Level 3 - Plant Managers.

V. POWER

Introduction

The conceptual underpinnings for the measure of power used in Looking Glass are described in McCall (1979). The basic definition of power used in that report was "...the ability to marshal the human, informational, and material resources to get something done. ...understanding, power involves understanding positions in social and organizational frameworks..." (p.5).

The questionnaire used to assess power distributions in Looking Glass (Figure V-1) recognizes the structural approach to power by focusing on divisional, departmental, and positional power differences. Participants first ranked each of the divisions, each of the departments, and each position in their division according to its power. They then rated (on five point scales) several potential sources of power in terms of their importance in determining the power of the most powerful person in the division. The two remaining items dealt with the effectiveness of the power distribution in the division and the power of the top four executives.

The power questionnaire was administered immediately following each simulation run. The Presidents received a slightly different version on which they described the company rather than a division.

As in other sections of this report, data have been aggregated according to the unit of analysis shown in the tables. For example, a divisional analysis would begin with an average of the scores for the division members. This would be treated as the score for that division for that run. These scores, in turn, would be averaged across the ten runs of LGI. In the case of breakdown by LGI level, scores were treated as independent and averaged using the total number of participants at the appropriate levels; for example, all forty Presidents and Vice-Presidents would be treated as a group. Any comparisons of new data with these tables should be based, of course, on the same aggregations.

The data should be interpreted as perceptions of reality, not as reality itself. That is, individuals, departments, or divisions might have been seen as powerful even though objective measures might not support that conclusion. The assumption here is that power is amorphous; perceptions are as important as the reality to understanding it.

LOOKING GLASS, INC.
WHO HAD THE POWER?

LOOKING GLASS POSITION _____

DIVISION _____

Power is difficult to define precisely, but most of us have a strong sense of what it means. It has to do with being able, for whatever reasons, to influence decisions, to get resources, to get one's own way. We'd like you to think about Looking Glass, Inc., in terms of who had the power.

1. Think first about the 3 divisions. From your perspective, which division was the most powerful? Which division seemed to have the most influence over matters affecting the whole organization? Please put a "1" in the blank by the most powerful division, a "2" by the second most powerful, and a "3" by the least powerful.

_____ APD _____ CGD _____ IGD

2. Think now about the departments within your division. Which of them had the most clout? Again, put a "1" by the most powerful department, "2" by the second most powerful, and "3" by the least powerful. Please rank all 3 departments, even if differences among them were small.

_____ Sales & Mktg. _____ Product Development _____ Manufacturing

3. Think about the people in your own division. Did certain people seem to have more influence than others over important matters concerning divisional decisions, resources, etc.? Put a "1" by the title of the person you thought most powerful, a "2" by the next most powerful, and so on. Be sure to rank all members of your division, including yourself, even if differences among them were small.

RANK ONLY YOUR OWN DIVISION!

_____ VP	_____ VP	_____ VP
_____ DIR-S&M	_____ DIR-S&M	_____ DIR-S&M
_____ DIR-MFG	_____ DIR-MFG	_____ DIR-MFG
_____ DIR-PD	_____ DIR-PD	_____ DIR-PD
_____ PM-CAPACITORS	_____ PM-LIGHTING	_____ PM-AUTO
_____ PM-INT CIRCS	_____ PM-FLAT	_____ PM-SPECIALTY
_____ PM-OPT FIBERS		

APD

CGD

IGD

Figure V-1

WHO HAD THE POWER? (Cont.)

4. Consider the person you just rated as most influential in your division. How do you suppose that person got to be so powerful? Listed below are a number of reasons a person might gain influence: In this particular case, how important was each reason in determining who you rated as most powerful? (Circle one number on each scale). Feel free to add some reasons of your own if the list doesn't cover what you want to say.

	not important		moderately important		very important
a. Position in the formal hierarchy:	1	2	3	4	5
b. Types of problems this person dealt with:	1	2	3	4	5
c. This person's competence:	1	2	3	4	5
d. The amount of information this person has access to:	1	2	3	4	5
e. This person's political savvy:	1	2	3	4	5
f. This person's aggressiveness in pursuing his/her goals:	1	2	3	4	5
g. This person was willing to take action when others didn't (or wouldn't):	1	2	3	4	5
h. _____	1	2	3	4	5

5. From your point of view, was the power in your division effectively distributed? In other words, did the people who had to confront the important problems have enough power to handle them--or did power end up in the wrong places?

1	2	3	4	5
Power was almost totally in the wrong places	For the most part, power was in the wrong places	The right people had some power and the wrong people had some	For the most part, the appropriate people had power	Power was almost totally in the right hands

Figure V-1

WHO HAD THE POWER? (Cont.)

6. From your perspective, which of the top four officers seemed to have the most impact on Looking Glass? (Check only one!)

_____ PRESIDENT

_____ VP, APD

_____ VP, CGD

_____ VP, IGD

7. Would you care to share any observations about power and influence in your division or in Looking Glass in general?

HIGHLIGHTS

Divisional Power (Tables V-1 - V-4)

The Advanced Products Division is consistently and clearly seen as the most powerful division of LGI. The Industrial and Commercial divisions are less powerful than APD and seen, in general, as about equal in power (the more powerful of the two differs marginally depending on the vantage point).

As Table V-2 shows, both APD and IGD describe themselves as the most powerful division, and CGD comes close to doing the same. There is a tendency for members of a division to attribute more power to their own division than others in the corporation attribute to it.

Department Power (Tables V-6 - V-10)

Regardless of the vantage point, Manufacturing is seen as the most powerful department in Looking Glass. It is consistently followed by Sales and Marketing and Product Development, in that order. This consistency is contrary to expectation; for example, one might expect Product Development to be more powerful in APD because that division depends so heavily on technological innovation. This was in fact the case during pretest runs (McCall & Lombardo, 1978).

Since LGI is a manufacturing organization (and since there are three manufacturing positions in each division), it is no surprise that Manufacturing is seen as the most powerful department overall. The average rank is even higher when participants themselves are from manufacturing organizations (and, interestingly, Product Development is ranked somewhat lower, see Table V-8).

LGI's upper level managers tend to give Sales and Marketing a slightly higher rank than do its lower level managers (see Table V-10).

Position Power (Tables V-11 and V-17)

Again, there is surprising consistency in the power attributed to positions in the divisions of LGI, and it is consistent with department rankings. Vice-President is far and away the most powerful position in each division.

Director of Manufacturing, Director of Sales and Marketing, Director of Product Development, and Plant Manager have the next highest average ranks (in that order) in all three divisions. With one exception, the Plant Managers are seen, on average, approximately equal in power in their divisions. The Plant Manager-Specialty Glass is consistently less powerful than the other Plant Managers in IGD (see Tables V-13 and V-17).

Sources of Power (Tables V-18 - V-22)

Given the consistency of the previous results, it is no surprise that the importance assigned to various sources of power is also consistent. Position is seen as the most important source of power in LGI. Access to information and types of problems dealt with are roughly equal in importance and are second most important as sources. Third is competence.

Some interesting differences emerge when divisional perceptions are compared with LGI Presidents' perceptions of power sources (see Tables V-19 and V-21). While Presidents view position and problems as important power sources, they also see aggressiveness and willingness to take action as highly important (these two sources were sixth and fifth in the overall ranking, near the top for the Presidents). There are obviously some strong perceptual differences from where the President sits.

A final highlight: participants from manufacturing organizations, as opposed to bankers, see political savvy as a more important power source (Table V-20). They also see competence as less important.

Effectiveness of the Power Distribution (Tables V-23 - V-25)

Did the people who had to confront the important problems have enough power to handle them? Overwhelmingly the answer was "yes" (close to 4, on average, on a 5 point scale). There is an interesting trend: Presidents (the most powerful position) and APD (the most powerful division) saw the power distribution in the most positive light (4.30 and 4.09 respectively, Table V-23), while CGD, the "milk cow," saw it least positively (3.75). The same trend appears in the level split (Table V-25), where highest effectiveness ratings are at the top (4.18), next highest at the Director level (3.92), and the lowest at the Plant Manager level (3.84).

Power of the Top Four Executives (Tables V-26 - V-29)

There is no doubt about it: no matter how the pie is cut, the President is seen as the most powerful top executive. After each run, all participants selected one of the four (President and Vice-Presidents) as most powerful and the President is it (averaging 13.4 of 20 votes cast). Of those votes that left the fold, the Vice-President of APD (the high technology and high power division) got the second most, with the other Vice-Presidents getting the fewest votes. Manufacturing managers saw the President as slightly less powerful than the bankers did (Table V-28).

Summary

Perceptions of power in LGI are remarkably consistent. APD was the most powerful division, Manufacturing the most powerful department, and Vice-President the most powerful position in each division. Position, information, and problem types were the most important sources of power. Of the top four executives of LGI, the President was seen as most powerful by far.

Table V-1
Divisional Power¹

<u>Division</u>	<u>Average Rank</u>	<u>Standard Deviation of Average Rank</u>	<u>Range of Average Rank</u>
APD	1.63	.30	1.20-2.00
CGD	2.20	.16	2.00-2.44
IGD	2.13	.23	1.81-2.42

¹Based on ten standardized runs; 1-most powerful, 3-least powerful.

Table V-2
Divisional Power - By
Division Doing the Ranking¹

Division Ranked	APD		CGD		ICD		PRESIDENT	
	Average Rank	Standard Deviation	Average Rank	Standard Deviation	Average Rank	Standard Deviation	Average Rank	Standard Deviation
APD	1.41	.30	1.71	.35	1.82	.46	1.50	.71
CGD	2.18	.28	1.94	.26	2.53	.27	2.10	.88
ICD	2.36	.33	2.30	.18	1.63	.40	2.40	.70

¹Based on ten standardized runs; 1-most powerful, 3-least powerful.

Table V-3
Banking vs. Manufacturing:
Divisional Power

<u>Division</u>	<u>Average Rank¹</u>	<u>Standard Deviation</u>	<u>Range</u>	<u>N</u>
APD				
Bank	1.70	.33	1.32-2.00	4
MFG	1.65	.27	1.35-2.00	5
CGD				
Bank	2.09	.11	2.00-2.25	4
MFG	2.25	.14	2.05-2.39	5
IGD				
Bank	2.18	.25	1.88-2.40	4
MFG	2.06	.23	1.81-2.42	5

¹1-most power, 3-least powerful.

Table V-4
Banking vs. Manufacturing:
Divisional Power - By Division Doing the Ranking¹

Division Ranked	APD			CGD			IGD			PRESIDENT		
	Average Rank	Standard Deviation	N	Average Rank	Standard Deviation	N	Average Rank	Standard Deviation	N	Average Rank	Standard Deviation	N
APD												
Bank	1.37	.24	4	1.89	.44	4	1.91	.42	4	1.75	.96	4
MFG	1.53	.31	5	1.63	.22	5	1.85	.53	5	1.40	.55	5
CGD												
Bank	2.10	.30	4	1.78	.33	4	2.48	.40	4	1.75	.96	4
MFG	2.19	.30	5	2.03	.15	5	2.54	.19	5	2.20	.84	5
IGD												
Bank	2.47	.37	4	2.32	.16	4	1.57	.52	4	2.50	.58	4
MFG	2.23	.32	5	2.24	.19	5	1.61	.34	5	2.40	.89	5

¹ 1-most powerful, 3-least powerful.

Table V-5
LGI Level:
Divisional Power¹

<u>Division</u>	<u>Average Rank</u>	<u>Standard Deviation</u>	<u>N</u>
APD			
Level 1	1.55	.71	40
Level 2	1.58	.79	86
Level 3	1.70	.83	64
CGD			
Level 1	2.26	.85	39
Level 2	2.25	.75	80
Level 3	2.09	.85	64
IGD			
Level 1	2.18	.72	39
Level 2	2.11	.77	81
Level 3	2.15	.72	62

¹Level 1 = President and Vice-Presidents, 2 = Directors, 3 = Plant Managers; 1-most powerful, 3-least powerful.

Table V-6
Department Power¹

<u>Department</u>	<u>Average Rank</u>	<u>Standard Deviation of Average Rank</u>	<u>Range of Average Rank</u>
Sales & Marketing	2.03	.27	1.44-2.32
Product Development	2.46	.24	2.10-2.80
Manufacturing	1.49	.34	1.10-2.26

¹Based on ten standardized runs; 1-most powerful, 3-least powerful.

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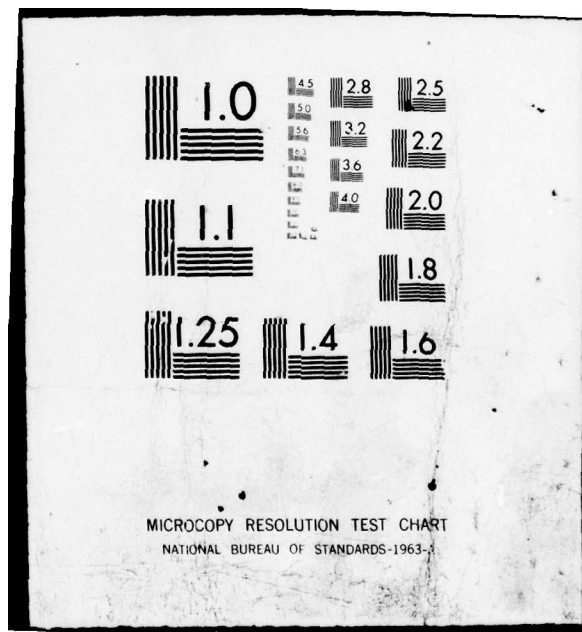


Table V-7
Department Power - By Division Doing the Ranking¹

Department Ranked	APD		CGD		IGD		PRESIDENT	
	Average Rank	Standard Deviation	Average Rank	Standard Deviation	Average Rank	Standard Deviation	Average Rank	Standard Deviation
Sales and Marketing	2.05	.35	1.97	.40	2.15	.35	1.60	.70
Product Development	2.40	.48	2.49	.40	2.54	.24	2.30	.67
Manufacturing	1.53	.43	1.53	.33	1.31	.41	2.10	.99

¹Based on ten standardized runs; 1-most powerful, 3-least powerful.

Table V-8
Banking vs. Manufacturing:
Department Power

<u>Department</u>	<u>Average Rank¹</u>	<u>Standard Deviation</u>	<u>Range</u>	<u>N</u>
Sales & Marketing				
Bank	1.99	.38	1.44-2.32	4
MFG	2.03	.21	1.75-2.32	5
Product Development				
Bank	2.39	.16	2.22-2.60	4
MFG	2.60	.22	2.26-2.80	5
Manufacturing				
Bank	1.61	.46	1.25-2.26	4
MFG	1.36	.23	1.10-1.63	5

¹1-most powerful, 3-least powerful.

Table V-9
Banking vs. Manufacturing:
Department Power - By Division Doing the Ranking¹

Department Ranked	APD		CGD		ICD		PRES	
	Average Rank	Standard Deviation	Average Rank	Standard Deviation	Average Rank	Standard Deviation	Average Rank	Standard Deviation
Sales & Marketing Bank	2.05	.53	1.83	.53	2.13	.23	1.75	.50
	2.06	.24	2.01	.32	2.11	.45	1.60	.89
Product Development Bank	2.21	.34	2.46	.28	2.53	.36	2.25	.96
	2.57	.59	2.67	.30	2.59	.14	2.40	.55
Manufacturing Bank	1.68	.54	1.71	.25	1.35	.57	2.00	1.15
	1.37	.37	1.30	.22	1.30	.35	2.00	1.00

¹ 1-most powerful, 3-least powerful.

Note: For the category "Bank," n = 4 in each case. For the category "MFG," n = 5 in each case.

Table V-10
LGI Level:
Department Power¹

<u>Department</u>	<u>Average Rank</u>	<u>Standard Deviation</u>	<u>N</u>
Sales & Marketing			
Level 1	1.80	.65	40
Level 2	2.04	.77	89
Level 3	2.17	.74	66
Product Development			
Level 1	2.60	.63	40
Level 2	2.40	.75	88
Level 3	2.48	.66	67
Manufacturing			
Level 1	1.60	.81	40
Level 2	1.54	.71	89
Level 3	1.36	.62	67

¹Level 1-President & Vice-Presidents
Level 2-Directors
Level 3-Plant Managers; 1-most powerful, 3-least powerful.

Table V-11
Position Power - APD¹

<u>Position</u>	<u>Average Rank²</u>	<u>Standard Deviation of Average Rank</u>	<u>Range of Average Rank</u>
VP	1.20	.20	1.00-1.71
DIR-S&M	3.42	.61	2.71-4.43
DIR-MFG	2.40	.47	1.86-3.29
DIR-PD	4.26	1.01	2.67-6.00
PM-CAPACITORS	5.46	.62	4.43-6.17
PM-INT CIRCUITS	5.42	.50	4.67-6.14
PM-OPT FIBERS	5.40	.46	4.71-6.14

¹Based on ten standardized runs.

²There are seven positions in APD; 1-most powerful, 7-least powerful.

Table V-12
Position Power - CGD¹

<u>Position</u>	<u>Average Rank²</u>	<u>Standard Deviation</u>	<u>Range</u>
VP	1.52	.51	1.00-2.33
DIR-S&M	3.37	.48	2.50-4.17
DIR-MFG	2.37	.53	1.67-3.50
DIR-PD	3.85	.66	3.00-4.83
PM-LIGHTING	4.83	.76	3.50-5.67
PM-FLAT	4.77	.51	4.00-5.50

¹Based on 10 standardized runs.

²There are six positions in CGD; 1-most powerful, 6-least powerful.

Table V-13
Position Power - IGD¹

<u>Position</u>	<u>Average Rank²</u>	<u>Standard Deviation</u>	<u>Range</u>
VP	1.25	.34	1.00-2.00
DIR-S&M	3.57	.50	2.83-4.17
DIR-MFG	2.27	.56	1.67-3.50
DIR-PD	3.83	.48	3.00-4.50
PM-AUTO	4.73	.33	4.17-5.17
PM-SPECIALTY	5.35	.39	4.67-5.67

¹Based on ten standardized runs.

²There are six positions in IGD; 1-most powerful, 6-least powerful.

Table V-14
Summary - Position Power¹

<u>Position</u>	<u>Average Rank Overall</u>	<u>Average Rank APD</u>	<u>Average Rank CGD</u>	<u>Average Rank IGD</u>
VP	1.52	1.20	1.52	1.25
DIR-S&M	3.48	3.42	3.37	3.57
DIR-MFG	2.39	2.40	2.37	2.27
DIR-PD	4.01	4.26	3.85	3.83
PM-CAPACITORS	-	5.46	-	-
PM-INT CIRCUITS	-	5.42	-	-
PM-OPT FIBERS	-	5.40	-	-
PM-LIGHTING	-	-	4.83	-
PM-FLAT	-	-	4.77	-
PM-AUTO	-	-	-	4.73
PM-SPECIALTY	-	-	-	5.35

¹There are seven positions in APD, six in CGD and IGD.

Table V-15
Banking vs. Manufacturing:
Position Power - APD¹

<u>Position</u>	<u>Average Rank</u>	<u>Standard Deviation</u>	<u>Range</u>	<u>N</u>
VP				
Bank	1.25	.32	1.00-1.71	4
MFG	1.18	.12	1.00-1.29	5
DIR-S&M				
Bank	3.76	.80	2.71-4.43	4
MFG	3.23	.41	2.71-3.71	5
DIR-MFG				
Bank	2.46	.49	2.00-3.14	4
MFG	2.35	.56	1.86-3.29	5
DIR-PD				
Bank	3.87	.57	3.33-4.43	4
MFG	4.62	1.31	2.67-6.00	5
PM-CAPACITORS				
Bank	5.33	.82	4.43-6.17	4
MFG	5.42	.47	5.00-6.00	5
PM-INT CIRCUITS				
Bank	5.43	.55	5.00-6.14	4
MFG	5.32	.52	4.67-5.71	5
PM-OPT FIBERS				
Bank	5.64	.58	4.86-6.14	4
MFG	5.20	.34	4.71-5.57	5

¹1-most powerful, 7-least powerful.

Table V-16
Banking vs. Manufacturing:
Position Power - CGD¹

<u>Position</u>	<u>Average Rank</u>	<u>Standard Deviation</u>	<u>Range</u>	<u>N</u>
VP				
Bank	1.33	.56	1.00-2.17	4
MFG	1.70	.51	1.00-2.33	5
DIR-S&M				
Bank	3.21	.58	2.50-3.83	4
MFG	3.47	.46	3.00-4.17	5
DIR-MFG				
Bank	2.79	.50	2.33-3.50	4
MFG	2.00	.31	1.67-2.33	5
DIR-PD				
Bank	3.71	.76	3.17-4.83	4
MFG	4.13	.51	3.50-4.83	5
PM-LIGHTING				
Bank	4.88	.96	3.50-5.67	4
MFG	4.63	.63	3.80-5.50	5
PM-FLAT				
Bank	5.04	.42	4.50-5.50	4
MFG	4.51	.54	4.00-5.17	5

¹1-most powerful, 6-least powerful.

Table V-17
Banking vs. Manufacturing:
Position Power - IGD¹

<u>Position</u>	<u>Average Rank</u>	<u>Standard Deviation</u>	<u>Range</u>	<u>N</u>
VP				
Bank	1.29	.48	1.00-2.00	4
MFG	1.27	.25	1.00-1.67	5
DIR-S&M				
Bank	3.46	.50	2.83-4.00	4
MFG	3.53	.52	3.00-4.17	5
DIR-MFG				
Bank	2.38	.80	1.67-3.50	4
MFG	2.07	.28	1.67-2.33	5
DIR-PD				
Bank	3.92	.65	3.00-4.50	4
MFG	3.77	.43	3.33-4.50	5
PM-AUTO				
Bank	4.71	.39	4.17-5.00	4
MFG	4.80	.32	4.33-5.17	5
PM-SPECIALTY				
Bank	5.25	.44	4.67-5.67	4
MFG	5.57	.09	5.50-5.67	5

¹1-most powerful, 6-least powerful.

Table V-18
Sources of Power¹

<u>Source</u>	<u>Average Importance</u> ²	<u>Standard Deviation</u>	<u>Range</u>
Position	4.36	.20	4.00-4.75
Problems	3.95	.18	3.55-4.20
Competence	3.77	.24	3.45-4.20
Information	3.97	.21	3.53-4.20
Savvy	3.21	.41	2.70-4.00
Aggressiveness	3.66	.34	3.11-4.35
Action Taking	3.52	.32	3.00-4.15

¹Based on ten standardized runs.

²Scale ranged from 1 (not important) to 5 (very important).

Table V-19
Sources of Power - By Division¹

Source	APD ²		CGD		IGD		PRESIDENT	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Position	4.37	.32	4.33	.45	4.40	.29	4.10	1.37
Problems	3.93	.24	3.88	.47	4.00	.34	4.22	.83
Competence	3.80	.28	3.72	.47	3.80	.47	3.67	.87
Information	4.03	.36	3.95	.56	3.97	.29	3.60	1.26
Savvy	3.37	.50	3.10	.49	3.12	.64	3.44	1.13
Aggressiveness	3.80	.37	3.47	.52	3.60	.43	4.10	.88
Action Taking	3.57	.65	3.45	.48	3.38	.39	4.33	.87

¹Scale ranged from 1 (not important) to 5 (very important).

²Based on ten standardized runs. Presidents ranged from 9 to 10 because of missing data.

Table V-20
Banking vs. Manufacturing:
Sources of Power

<u>Source</u>	<u>Average Importance¹</u>	<u>Standard Deviation</u>	<u>Range</u>	<u>N</u>
Position				
Bank	4.30	.25	4.00-4.60	4
MFG	4.32	.07	4.25-4.40	5
Problems				
Bank	3.97	.16	3.85-4.20	4
MFG	3.92	.22	3.55-4.15	5
Competence				
Bank	3.86	.12	3.70-3.95	4
MFG	3.61	.18	3.45-3.90	5
Information				
Bank	4.01	.13	3.95-4.20	4
MFG	3.88	.25	3.53-4.15	5
Savvy				
Bank	2.94	.20	2.70-3.15	4
MFG	3.27	.33	2.89-3.65	5
Aggressiveness				
Bank	3.65	.20	3.45-3.85	4
MFG	3.52	.28	3.11-3.90	5
Action Taking				
Bank	3.44	.36	3.00-3.80	4
MFG	3.45	.15	3.22-3.60	5

¹Scale ranged from 1 (not important) to 5 (very important).

Table V-21
Banking vs. Manufacturing: 1
Sources of Power - By Division¹

Source	APD ²		CGD		IGD		PRESIDENT	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Position								
Bank	4.36	.25	4.21	.71	4.33	.30	4.25	.96
MFG	4.26	.27	4.43	.22	4.37	.25	3.80	1.79
Problems								
Bank	3.89	.07	3.96	.34	4.08	.29	4.00	1.00
MFG	3.91	.33	3.83	.63	3.97	.43	4.20	.84
Competence								
Bank	3.96	.14	3.84	.46	3.75	.22	3.67	1.15
MFG	3.71	.33	3.46	.31	3.70	.57	3.40	.55
Information								
Bank	4.11	.34	4.08	.50	3.88	.16	3.75	1.50
MFG	3.91	.41	3.91	.70	3.93	.30	3.20	1.10
Savvy								
Bank	3.00	.42	3.17	.24	2.63	.44	3.00	1.00
MFG	3.57	.43	2.83	.35	3.37	.58	3.40	1.14
Aggressiveness								
Bank	3.68	.14	3.46	.55	3.67	.24	4.50	.58
MFG	3.75	.36	3.28	.26	3.47	.56	3.80	1.10
Action Taking								
Bank	3.41	.77	3.29	.50	3.54	.37	4.00	1.00
MFG	3.46	.39	3.41	.32	3.30	.45	4.40	.89

¹Scale ranged from 1 (not important) to 5 (very important).

²Banking is based on 4 runs, Manufacturing on 5. President ranges from 3 to 5 because of missing data.

Table V-22
LGI Level:
Sources of Power¹

<u>Source</u>	<u>Average Importance</u> ²	<u>Standard Deviation</u>	<u>N</u>
Position			
Level 1	4.30	.99	40
Level 2	4.44	.86	90
Level 3	4.27	1.02	70
Problems			
Level 1	4.00	1.00	39
Level 2	3.88	.83	90
Level 3	4.01	.92	68
Competence			
Level 1	3.55	.95	38
Level 2	3.82	.89	90
Level 3	3.82	.96	68
Information			
Level 1	3.43	1.20	40
Level 2	4.18	.87	90
Level 3	4.01	.98	68
Savvy			
Level 1	3.10	1.14	39
Level 2	3.29	1.17	90
Level 3	3.18	1.24	67
Aggressiveness			
Level 1	3.70	.99	40
Level 2	3.64	1.06	90
Level 3	3.66	1.09	68
Action Taking			
Level 1	3.79	1.06	39
Level 2	3.35	1.19	89
Level 3	3.60	1.14	67

¹Level 1-President & Vice-Presidents
Level 2-Directors
Level 3-Plant Managers

²Scale ranged from 1 (not important) to 5 (very important).

Table V-23
Perceived Effectiveness of the Power Distribution in LGI¹

<u>Source of Rating</u>	<u>Average Effectiveness</u>	<u>Standard Deviation</u>	<u>Range</u>	<u>N</u>
Overall	3.95	.14	3.80-4.20	10
APD	4.09	.27	3.71-4.43	10
CGD	3.75	.30	3.33-4.33	10
IGD	3.92	.12	3.83-4.17	10
PRESIDENT	4.30	.48	4.00-5.00	10

¹Response stem ranged from 1 (power was almost totally in the wrong places) to 5 (power was almost totally in the right hands).

Table V-24
Banking vs. Manufacturing:
Perceived Effectiveness of the Power Distribution in LGI¹

<u>Source of Rating</u>	<u>Average Effectiveness</u>	<u>Standard Deviation</u>	<u>Range</u>	<u>N</u>
Overall				
Bank	3.89	.06	3.80-3.95	4
MFG	3.94	.15	3.80-4.10	5
APD				
Bank	4.00	.23	3.71-4.29	4
MFG	4.09	.30	3.71-4.43	5
CGD				
Bank	3.67	.30	3.33-4.00	4
MFG	3.70	.18	3.50-3.83	5
IGD				
Bank	3.87	.08	3.83-4.00	4
MFG	3.97	.14	3.83-4.17	5
PRESIDENT				
Bank	4.50	.58	4.00-5.00	4
MFG	4.20	.45	4.00-5.00	5

¹ Scales ranged from 1 (power was almost totally in the wrong places) to 5 (power was almost totally in the right hands).

Table V-25
LGI Level:
Perceived Effectiveness of the Power Distribution in LGI¹

<u>Source of Rating</u>	<u>Average Effectiveness</u> ²	<u>Standard Deviation</u>	<u>Range</u>	<u>N</u>
Level 1	4.18	.60	3.00-5.00	39
Level 2	3.92	.55	2.00-5.00	90
Level 3	3.84	.73	2.00-5.00	70

¹Level 1 - President and Vice-Presidents
Level 2 - Directors
Level 3 - Plant Managers

²Response stem ranged from 1 (power was almost totally in the wrong places) to 5 (power was almost totally in the right hands).

Table V-26
Power of Top Four Officers¹

<u>Position</u>	<u>Average Number of Votes</u>	<u>Standard Deviation</u>
President	13.40	3.84
VP-APD	3.20	2.65
VP-CGD	1.20	1.03
VP-IGD	1.30	1.34

¹Each participant voted for one of the top four officers as "most powerful." This table reports the average number of votes received by each of the four (based on ten runs).

Table V-27
Power of Top Four Officers - By
Division Doing the Voting¹

Position	APD		CGD		IGD	
	Average Number of Votes	Standard Deviation	Average Number of Votes	Standard Deviation	Average Number of Votes	Standard Deviation
President	4.80	1.75	3.70	1.49	4.10	1.37
VP-APD	1.70	1.89	.60	.84	.70	.67
VP-CGD	.10	.32	.70	.95	.40	.52
VP-IGD	.20	.42	.40	.84	.70	.82

¹Each participant voted for one of the top four officers as "most powerful." This table reports the average number of votes received by each of the four, broken down by division doing the voting. APD has seven members, IGD and CGD six each. Based on ten runs.

Table V-28
Banking vs. Manufacturing;
Power of Top Four Officers¹

<u>Position</u>	<u>Average Number of Votes</u>	<u>Standard Deviation</u>
President		
Bank	15.00	2.94
MFG	12.40	4.72
VP-APD		
Bank	1.50	1.73
MFG	4.20	2.95
VP-CGD		
Bank	1.50	1.00
MFG	1.00	1.22
VP-IGD		
Bank	.75	.50
MFG	1.60	1.82

¹Each participant voted for one of the top four officers as "most powerful." This table reports the average number of votes received by each of the four, broken down by manufacturing and banking samples. Based on four bank and five manufacturing runs.

Table V-29
LGI Level:
Power of Top Four Officers¹

<u>Position</u>	<u>Average Number of Votes In a Run</u>	<u>Percentage Of Total²</u>
President		
Level 1	3.4	85.0
Level 2	5.4	62.1
Level 3	4.6	71.9
VP-APD		
Level 1	0.5	12.5
Level 2	1.6	18.4
Level 3	1.1	17.2
VP-CGD		
Level 1	0.1	2.5
Level 2	0.7	8.0
Level 3	0.4	6.3
VP-IGD		
Level 1	0.0	0.0
Level 2	1.0	11.5
Level 3	0.3	4.7

¹Level 1-President & Vice-Presidents
Level 2-Directors
Level 3-Plant Managers
Sample sizes are 40, 87, and 64 respectively.

²Based on total vote count rather than average votes per run.

VI. INFORMATION FLOW & DECISION PROCESSES

Introduction

Complex simulations are enough like real organizations that measuring information-processing and decision-making is tough to do. It is hard to tell who told what to whom, who remembered what, who did what, and get agreement on what, if anything, was done. Here, though, a simulation has several advantages: 1) where information starts, 2) where information ends up, and 3) what requests for outside information are made are either a given or can be ascertained. In addition, since both the problems that can be addressed and the decisions that might be made are reasonably predictable, we felt we could design standard measures to tap information-processing and decision-making behavior.

Although there have been numerous lab studies of decision-making on discrete problems and retrospective analyses of corporate and political decisions, complex decisions in process in an ongoing organization have, to our knowledge, never been studied. Because of the control that Looking Glass offers, we hoped to shed some light on how decisions get made and information processed, which decisions are avoided and which made, who is seen as responsible for decisions, and how all these relate to effective and ineffective performance. The information-processing and decision-making measures will be described here; the performance measures in Section VII.

Development of the Decision-Making Questionnaires

I. Problems and Decisions

From the 140 problems that managers faced in Looking Glass, we selected the problems that came up most often in the pretest runs and the problems that were objectively most important:

- 12 in APD and IGD
- 13 in CGD
- 4 for the Management Committee (Vice-Presidents and President)
- 6 for the President (two major problems from each of the divisions)

We then collected all memos relevant to a given problem and selected bits of information most critical to the definition of, for example, energy, as something to be reckoned with. We also noted all decisions we had seen managers make or that reasonably could have been made on a given problem.

For each of the problems on the various decision-making questionnaires, we asked managers to check 1) how much information they had about a problem, 2) what was done to resolve the problem (if anything), 3) how many people were involved in making the decision, 4) who was primarily responsible for making the decision, and 5) how good the decision was. Three, four, and five were omitted if no decision was made.

II. Divisional/Corporate Priorities

The Center for Creative Leadership's Board of Governors is composed primarily of corporation presidents, vice-presidents, chairmen of the board, and university presidents. In October, 1978, after studying the Looking Glass materials, they recommended priorities and concrete actions that could be taken for each of the divisions and the corporation as a whole.

We edited and slightly reorganized their lists and asked managers 1) if X were clearly established as a priority, 2) if it were a priority, who was primarily responsible for setting it, and 3) whether or not it was a priority, what actions were taken. (Data on Priorities are reported in Section VII.)

III. Individual/Divisional Presidential Ratings of Effectiveness

Each manager was asked to rate on a 5-point scale (from ineffective to extremely effective) how effective self and others were as managers. All positions rated the President and those positions within their division. Managers also provided a global rating on the overall effectiveness of their division. (These data are reported in Section VII.)

The Management Committee and President's Questionnaires

The Management Committee and President's questionnaires were identical in format to those of the divisions with one exception. The question asking how many people were involved in the decision was dropped because we would have had to list all 20 positions.

Also, on the Management Committee questionnaire, a section was added asking the top management of Looking Glass what they decided about thirteen problems involving major investments, divestitures or reallocations of resources.

They responded from definitely no, leaning toward no, leaning toward yes, or do not know to each question. Their average responses to these questions, and which three problems they thought were most important are reported here. The financial impact of these decisions is reported in Section VII.

Scale Development

During early runs of the simulation, we added another problem to each divisional questionnaire, asking about a mythical shortage of a raw material. In short, we added a consistency or lie scale. After giving managers about 600 opportunities to check something they could not possibly know and finding only two checks, we omitted the problem from subsequent runs.

After going through several iterations, we came up with one problem identification, thirteen decision-making and six information processing scales that hung together conceptually. The information scales are straightforward (e.g., upward communications) and their composition is explained on the same page where tables appear (see Tables VI-1 and 2).

To develop the decision-making scales (such as tactical decisions or strategic ones, see Figure VI-1 for complete list), we consulted with Mark Appelbaum of the University of North Carolina. After discussion, we agreed on three assumptions: 1) organizations are interrelated by design; so would our scales be, 2) items would be coded on more than one scale because our concepts were not independent, and 3) our scales would be derived rationally, then tested empirically.

Four of us took each of the questionnaires and independently coded them on the thirteen decision-making and one

problem identification scales. The codes were tallied (a 75% agreement criterion was considered acceptable) and disagreements resolved through discussion, with the author of the Looking Glass division in question serving as arbiter. The scales consisted of items indicating, for example, strategic decisions or extremely difficult problems.

Scales were computed on a 0 to 1 basis, with 0 meaning no decisions were made; and 1, the maximum number of decisions was made. Each individual received a scale score, and these scores were then aggregated to a divisional level. These scales are reported here.

Because division members often disagreed on what decisions were made, we also had to decide if a decision was made on a given problem for certain scales (poor choices and good choices reported in Section VII; and key problems handled, reported here). To accomplish this, we independently coded five simulation runs each, with one run coded by both as an agreement check. On 77% of the 37 major problems we agreed on all decision(s) that were made. On the more than 200 specific decisions that could be made, we had 91% agreement on what was done or not done. The rules for determining if a decision was made were:

- if a majority checked a particular decision (APD)
- if there was a 50-50 split (CGD and IGD)
- if a decision was clearly under the control of a specified position or positions that checked it.

The only exception to these rules was, that 3) could override 1) or 2) in some cases. For example, regardless of how many checked "The Vice-President joined the Board,) if the Vice-President said no, the answer was no.

Once the independent codings were done, the authors met and resolved differences through discussion.

Information-Processing and Decision-Making Tables

Reported in this section are:

- Information diffusion; upward, downward and lateral communications; and knowledge of information originating outside a particular division

- Number of people involved in key decisions
- Positions responsible for decision in each division and the Management Committee
- Nine decision-making scales (see Figure VI-1)
- Total number of problems decided; problems decided that were internal in origin, external in origin, and which were judged most difficult
- Average of the decision inclinations of the Management Committee on the thirteen major capital problems facing Looking Glass.

As in other sections, norms are reported overall, by level, and for banking and manufacturing managers.

SCALE DEFINITIONS

1. Problem Identification

The extent to which key information relevant to identifying the existence of an important problem is disseminated to members of the divisions. For each problem, keyed items are one or two pieces of information that are a tip-off, trigger, clue to recognizing the generic problem. They are the keys to the biggest bucket.

2. Maybe-It-Will-Go-Away

The extent to which decision choices reflect a tendency to continue things the way they are, implying self-deception or an unjustified hope that the problem will go away if it is ignored long enough. Keyed items are decisions that will serve to continue things basically as they are, that represent superficial responses to a problem.

3. Solution Expansion

The extent to which chosen problem solutions reflect a tendency to go beyond the data given at the start of the simulation. Keyed items are choices that were not directly suggested as solutions to the problem by information available at the start and typically represent a broader search for solutions. These are not necessarily creative or non-obvious (though they may be), but they clearly require going beyond the givens.

4. Decoupling

The extent to which decision choices are likely to generate conflict with other divisions or to sever interconnectedness among divisions. The keyed items are likely to create disagreement over goals or means to goals, including competition for resources, encroachment of product lines or customers, and creation of inequities. The likely result of such actions is isolation of the division, i.e., decoupling.

5. Tactical Decisions

The extent to which decision choices tend to be temporary or short-term solutions to the problem. In some cases, these may be appropriate solutions, but they may also be the choices aimed at pieces of the problem or only temporary solutions of the problem.

6. Strategic Decisions

The extent to which decision choices reflect a long-term perspective on the problem. Keyed items may not provide an immediate solution, but they do represent a long-term strategy aimed at solving the problem in the long run. They tend to be more comprehensive, more complex, and require more time to implement than tactical decisions.

7. Designer

The extent to which solutions reflect a tendency for trying to solve problems by direct manipulation of organizational structure. Structure is defined as procedures, policies, and reporting relationships. This scale would not include solutions - such as acquisition, divestiture, or plant changes - that might result in structural changes but for which structure is an outcome rather than an antecedent.

8. Investment

The tendency to choose solutions involving large expenditures. Items assigned to this scale should represent relative "big ticket" solutions.

9. Coupling

The extent to which decisions create interdependence among divisions, for example, entering into formal relationships on internal transfer or personnel exchanges.

10. Response To Internal Pressure

Percent of problems on which a decision was made that have their cause primarily within the division itself.

11. Response To External Pressure

Percent of problems on which a decision was made that have their cause primarily outside of the division, either in the external environment or in another division.

Figure VI-1

12. Problem Difficulty

Identification of the five toughest problems facing the division (a combination of the interdependence requirements, magnitude, and difficulty).

Figure VI-1

HIGHLIGHTS

Information-Processing and Decision-Making¹ (Tables VI-1 - VI-11)

Divisional Comparisons

Due to the complexity of the information-processing and decision-making measures, we have dropped the table-by-table analysis used in the other sections and substituted a profile of each division of Looking Glass. Tables are referenced immediately following the presentation of the relevant finding.

APD

Outward turned. Of all the divisions, APD was the most outward turned. They found out more information from outside the division and outside the live roles than did the other divisions (Tables VI-2 and 3). Perhaps unfortunately, they relied least on themselves, being the lowest by far in lateral communication (Table VI-2).

More participative. APD involved more people in key decisions than did the other divisions (Table VI-4). Who made the decisions equalled who had the power (see Section V): the Vice-President, Director of Manufacturing, and Director of Sales & Marketing. Interestingly, it was the only division whose decision responsibility ratings (Table VI-5) did not correspond exactly to peer ratings of performance (see Section VII). Manufacturing and the Vice-President were first and second, but Sales & Marketing was sixth. Apparently, Sales & Marketing made decisions, but they were not too cheerfully received.

Action oriented. No one could accuse APD managers of shirking a tough assignment: coping with a volatile environment. APD took the most action on both the most difficult problems and the externally located problems. They were the most strategic and the most likely to make design changes (Tables VI-9 and 10).

¹To avoid repetition, performance measures (e.g., good choices, poor choices, peer ratings) mentioned in this Section are reported in Section VII.

Cautious at times. APD ducked several areas. They avoided both alienating the other divisions and joining forces with them. In addition, they were cautious investors. Overall, APD faced the outside, communicated basically with the President, and let the other divisions alone (Tables VI-5 and 9).

Cruel truths. We initially predicted that APD would be the toughest of the divisions to manage. It was: APD racked up the most poor choices as well as the most maybe-it-will-go-aways (decisions that continue things basically as they are). Further, APD was surprisingly consistent across runs. More than the other divisions, APD managers coped in similar ways and arrived at similar decisions (Tables VI-9 and 10).

Perceptions. Regardless of the difficulties APD managers experienced, the division had a favorable image. APD was consistently seen as most powerful (Section V), the President thought the Vice-President of APD was the most effective Vice-President, and APD managers rated their divisional performance the highest (Section VII).

CGD

Open communication. CGD was clearly the information-sharing division. It had the most lateral and downward communication, and led the divisions in both general information sharing and sharing information bits most critical to problem identification (Tables VI-1, 2, and 9).²

Moderate participation. CGD involved almost as many people in decisions as APD did (Table VI-4). Who made the decisions (Table VI-6) matched with power and peer performance ratings in Sections V and VII. Decision responsibility was most often attributed to the Vice-President, Director of Manufacturing, and Director of Sales & Marketing.

²CGD started with less information than APD and IGD and ended up with about the same. Even though CGD clearly shared more, some of the effect must be credited to the laws of probability. When a CGD manager told another a bit of information, the likelihood was greater that the receiver did not know it than in APD and IGD.

Cautiously unpredictable. CGD took the least action on problems, but had the most variance across runs (Table VI-10). On most of the decision-making scales, the division hung around the mean, dipping below on maybe-it-will-go-away and making design changes (Table VI-9).

Playing its role. CGD played the role of the stable "milk cow," sharing lots of information and making fewer decisions (but not drastically fewer), but making fewer mistakes. Of the divisions, it made the fewest poor choices and the most good ones (see Section VII).

IGD

Bureaucratic structure. On the surface, IGD looks grim. It had the most upward communication and the least downward (Table VI-2). It involved the fewest people in decisions and was least likely to make a team decision (Table VI-4). As cited in Section III, division activities were dominated by paperwork.

Decision-making. Who was responsible for decisions in IGD matched the peer performance ratings in Section VII. The Director of Manufacturing, the Vice-President, and the Plant Managers of Auto Glass were most often attributed decision responsibility. IGD was the only division whose decision responsibility ratings did not also match the power ratings for the various positions (Section V).

Mysterious strategy. Compared with the other divisions, IGD attacked internal problems, and avoided external and difficult ones (Table VI-10). It shared the least information critical to problem identification, and was least likely to expand solutions beyond what was given. IGD managed to take both the most actions to decouple itself from the other divisions and the most actions to couple itself with them (Table VI-9).

One explanation for this seeming confusion is that IGD pushed its investment needs much more than the other divisions, making it internally-oriented and a battler for scarce resources. At the same time, it actively cooperated in mutually beneficial projects in the research and production areas.

Not grim at all. There is no evidence that IGD's rather unattractive exterior and schizophrenic strategies had any disastrous effects. Its climate was average (Section IV), it made almost as few poor choices as CGD, and a moderate number of good choices (Section VII).

The Management Committee

Team-oriented. The Management Committee was the only unit in Looking Glass to cite team decisions as frequently made (Table VI-8). Most commonly, decisions were made jointly, by the President, or by the Vice-President of IGD (this rating reflects the aggressive investment stance taken by the division).

Decisions. The Management Committee was favorably inclined toward seven of the thirteen investment decisions (Table VI-11).

Priorities. The top four priorities were: converting to all electric melters, expanding the Auto Glass plant, funding new float process, and the purchase of Cascade. Of these, only the expansion of the Auto Glass plant was frequently done. The problems seen as most important were among those least frequently decided (Table VI-11).

Level Differences (Tables VI-12 - VI-16)

Phones. As level decreased, phone activity increased. Plant Managers made more phone calls, had more requests from the Outside Information Notebook, and had more variance. Across divisions, the APD Directors and the IGD Plant Managers were most active (Table VI-12).

Involvement. Except in IGD, the trend was for Vice-Presidents to say one or two people were involved in making decisions, and the other levels to say three or four (this trend was particularly strong in APD). In IGD, while the mode was one or two for all levels, Plant Managers were most definite about the lack of involvement (Table VI-13).

Involvement and decision responsibility patterns. For APD and CGD, both the number of people involved in the decision and who was responsible for making it followed this pattern:

- Vice-Presidents perceived less involvement and tended to attribute decision-making responsibility to themselves.
- Directors saw more involvement and attributed about ³ as many decisions to themselves as did other levels.

³The exception was Product Development in CGD. The position received numerous attributions from the Director level, and few from other levels.

- Plant Managers saw more involvement, attributed more decisions to themselves, and attributed fewer to the Vice-President (Tables VI-14 and 15).

IGD's pattern was:

- All levels saw involvement in making decisions as restricted most often to one or two people.

In IGD, as level decreased, attributions of decision responsibility to the Vice-President, Sales & Marketing, and Product Development fell much more than in the other divisions, and attributions to Manufacturing and the Plant Managers rose sharply. This reflects a strong opinion (84% of their total attribution) on the part of the Plant Managers that they and the Director of Manufacturing made the decisions (Table VI-16).

Banking vs. Manufacturing (Tables VI-17 - VI-27)

Information flow. Banking managers shared more information, had more upward and lateral communication, and made more phone calls. Manufacturing managers, although they made fewer calls, more often asked for critical information located in the Outside Information Notebook (Tables VI-17, 18, and 19). This was particularly so for CGD and the President.

Involvement. Although no strong patterns emerged, bankers appeared to have slightly more involvement in decision-making than did manufacturing managers (Table VI-20).

Position. Manufacturing managers saw Vice-Presidents as less and Sales & Marketing Directors as more involved in decision-making than did bankers (Tables VI-21, 22, and 23).

Decision-making and key problem handling. There were no differences in how decisions were made or key problems handled as reported by the divisions (Tables VI-25 and 26).

Management Committee decision-attributions. There was a difference in how decisions were made at the Management Committee level. Bankers said that most of their decisions were made jointly. The President and the Vice-President of APD were a distant second and third most responsible for making decisions. Manufacturing managers attributed primary responsibility to the President and the Vice-President of IGD. Jointly made decisions received the third greatest number of attributions. In summary, bankers relied on

jointly made decisions 63% of the time vs. 29% for manufacturing. Manufacturing managers relied on the President and the Vice-President of IGD for 61% of their decisions vs. 23% for bankers (Table VI-24).

Capital problems. On ten of the thirteen capital investment problems, bankers and manufacturing managers had similar decision inclinations. They differed in that bankers were more favorably inclined concerning converting to electric melters and less favorably inclined toward purchasing Cascade (Table VI-27). Manufacturing managers were more likely to favor modernizing Lighting Products.

Priorities. The priorities of the respective Management Committees also differed. Bankers considered converting to electric melters, funding float research, and consolidating the plants most important; manufacturing managers considered converting to electric melters, purchasing Cascade, and expanding Auto Glass as most important to decide (Table VI-27).

Do bankers and manufacturing managers differ? Not much. Bankers shared more information, and the decision-making practices of the respective Management Committees varied widely. Within the divisions, the decision-making practices and handling of key problems were virtually identical, as were the number of good and poor choices reported in Section VII.

Table VI-1
Information Diffusion
By Division and LGI¹

	<u>LGI</u>	<u>APD</u>	<u>CGD</u>	<u>IGD</u>
Average Diffusion	.189	.132	.278	.137
Standard Deviation	.047	.079	.057	.056
N	10	10	10	10

¹Diffusion of information is calculated on the basis of exposures to selected information (see the information items in the Decision-Making Questionnaires for each division). The formula is:

$$\text{diffusion} = \frac{\text{exposures to information (from DMQ)} - \text{exposures at start}}{\text{total possible exposures} - \text{exposures at start}}$$

For LGI overall, the diffusion index ranges from a theoretical minimum of -.43 (negative scores represent a loss of information compared to the start) through 0 (the amount known at the end was the same as at the start) to 1 (everyone knew everything). For the divisions, the theoretical minimums are: APD, -.52; CGD, -.32; IGD, -.48.

At the start of the simulation, the division has x information/total possible information: APD, .35; CGD, .25; IGD, .33. At the end of the simulation: APD, .43; CGD, .45; IGD, .42.

Table VI-2
Information Flow
By Division and LGI¹

	<u>LGI</u>	<u>APD</u>	<u>CGD</u>	<u>IGD</u>
Average Upward Flow ²	.3710	.3570	.3690	.3810
Standard Deviation	.0515	.1024	.1007	.0666
Average Downward Flow ³	.2320	.2550	.2680	.1770
Standard Deviation	.0571	.0805	.1061	.0464
Average Lateral Flow ⁴	.1240	.0570	.1470	.1230
Standard Deviation	.0347	.0380	.0704	.0613
Average Outside Info ⁵	-	.3560	.2700	-
Standard Deviation	-	.0868	.5944	-

¹Based on n of ten runs.

²Upward flow is indexed by tracking specific information bits. We know who has each bit at the start, the DMQ shows who knew what at the end. By looking at information held exclusively by lower levels at the start, it is possible to calculate how many higher level people were exposed to it at the end. Scores range from a minimum of 0 (no one at upper levels was exposed to information held at lower levels) to 1 (everyone at upper levels was exposed to all information held at lower levels).

³Downward flow is calculated in the same manner as upward flow, except looking at information held at the start by upper levels.

⁴Lateral flow indexes the amount of sharing of exclusive information among Directors and among Plant Managers. It also ranges from 0 to 1.

⁵For APD and CGD it is possible to calculate how many people were exposed to information outside of the divisions. Outside information = possible exposures - actual exposures/possible exposures (range, 0 to 1).

Table VI-3
Use of Outside Information
(By Telephone)
By Division and LGI

	<u>LGI Total</u>	<u>From APD</u>	<u>From CGD</u>	<u>From IGD</u>	<u>From PRESIDENT</u>
Average Number of Requests Per Person by Phone ¹	3.55	3.71	3.13	3.96	2.44
Standard Deviation	.99	1.40	1.52	.82	2.46
Average Number of Original Requests for Information From Outside Information Notebook (per person)	.89	1.03	.80	.83	.70
Standard Deviation	.33	.38	.56	.48	1.25
<hr/>					
	<u>Corporate</u>	<u>APD</u>	<u>CGD</u>	<u>IGD</u>	
Mean Percent of Outside Information ²	33.3	36.0	25.6	26.2	
N	3	10	9	10	

¹ LGI, 20 people; APD, 7; CGD, 6; IGD, 6. Requests per person based on nine runs; requests per person from outside information notebook based on ten runs.

² Percent of outside information available that entered the system.

Table VI-4
Involvement in Key Decisions
By Division and LGI

	Number of People Involved ¹					Mean ³	Standard Deviation
	One or Two $\frac{n^2}{\%}$	Three or Four $\frac{n^2}{\%}$	Five or More $\frac{n^2}{\%}$				
APD	103	31.9	172	53.3	48	14.9	.35
CGD	103	38.3	122	45.4	44	16.4	.33
IGD	126	50.8	103	41.5	19	7.7	.20
LGI (Without PRES)	332	39.5	397	47.3	111	13.2	.22

¹Based on responses to the Decision-Making Questionnaires. Ten runs.

²N is only those who responded.

³To complete the mean, one or two = 1; three or four = 3; five or more = 5.

Table VI-5
Attribution of Decision Responsibility
To Positions - APD¹

<u>Position</u>	<u>Number of Attributions²</u>	<u>Percent of Attributions</u>	<u>Mean Number Of Attributions</u>	<u>Standard Deviation</u>
VP-APD	107	23.7	10.7	3.1
DIR-S&M	72	16.0	7.2	3.6
DIR-MFG	91	20.2	9.1	4.1
DIR-PD	52	11.5	5.2	2.5
PM-CAPACITORS	24	5.3	2.4	1.8
PM-INT CIRCUITS	30	6.7	3.0	1.9
PM-OPT FIBERS	13	2.9	1.3	2.1
PRESIDENT	52	11.5	5.2	1.9
OTHERS	10	2.2	1.0	1.1

¹ Based on ten runs.

² N is only those who responded; attributions include self-ratings.

Table VI-6
Attribution of Decision Responsibility
To Positions - CGD¹

<u>Position</u>	<u>Number of Attributions²</u>	<u>Percent of Attributions</u>	<u>Mean Number Of Attributions</u>	<u>Standard Deviation</u>
VP-CGD	97	25.5	9.7	4.7
DIR-S&M	65	17.1	6.5	3.6
DIR-MFG	76	20.0	7.6	3.0
DIR-PD	48	12.6	4.8	2.4
PM-LIGHTING	31	8.2	3.1	3.0
PM-FLAT	30	7.9	3.0	1.3
PRESIDENT	23	6.1	2.3	2.5
OTHERS	10	2.6	1.0	.7

¹Based on ten runs.

²N is only those who responded; attributions include self-ratings.

Table VI-7
Attribution of Decision Responsibility
To Positions - IGD¹

<u>Position</u>	<u>Number of Attributions²</u>	<u>Percent of Attributions</u>	<u>Mean Number Of Attributions</u>	<u>Standard Deviation</u>
VP-IGD	75	23.7	7.5	2.8
DIR-S&M	38	12.1	3.8	1.3
DIR-MFG	85	26.8	8.5	3.5
DIR-PD	33	10.4	3.3	2.8
PM-AUTO	42	13.2	4.2	2.0
PM-SPECIALTY	24	7.6	2.4	1.1
PRESIDENT	12	3.8	1.2	1.1
OTHERS	8	2.5	.8	1.0

¹Based on ten runs.

²N is only those who responded; attributions include self-ratings.

Table VI-8
Attribution of Decision Responsibility
To Positions - Management Committee¹

<u>Position</u>	<u>Number of Attributions²</u>	<u>Percent of Attributions</u>	<u>Mean Number Of Attributions</u>	<u>Standard Deviation</u>
PRESIDENT	19	26.0	1.90	1.52
VP-APD	6	8.2	.60	.70
VP-CGD	4	5.5	.40	.70
VP-IGD	13	17.8	1.30	1.57
JOINT DECISION	23	31.5	2.30	1.64
VPS DECIDED	6	8.2	.60	.70
SOMEONE ELSE	2	2.7	.20	.63

¹ Based on ten runs.

² N is only those who responded; attributions include self-ratings.

Table VI-9
Decision-Making Scales
By Division and LGI¹

Scale	LGI		APD		CGD		IGD	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Problem Identification	.5049	.0340	.4829	.0455	.5885	.0556	.4468	.0488
Maybe-it-will-go-away	.0847	.0206	.1083	.0299	.0675	.0418	.0744	.0240
Solution Expansion	.0539	.0187	.0599	.0205	.0632	.0359	.0375	.0233
Decoupling	.0343	.0158	.0262	.0262	.0375	.0236	.0405	.0373
Tactical	.0939	.0158	.0907	.0242	.0942	.0398	.0975	.0289
Strategic	.0861	.0230	.0963	.0420	.0774	.0408	.0830	.0307
Designer	.0775	.0160	.0918	.0330	.0667	.0374	.0715	.0339
Investment	.1150	.0370	.0743	.0534	.0964	.0760	.1810	.0999
Coupling	.0535	.0289	.0300	.0184	.0574	.0541	.0771	.0520

¹ Based on ten runs. See Figure VI-1 for definitions. Scales vary from 0 (no decisions made) to 1 (all decisions made).

Table VI-10
Key Problem Handling by Division and LGI¹

	Action Taken (All Problems) ²			Action Taken (Internal Problems) ³			Action Taken (External Problems) ⁴			Action Taken (Difficult Problems) ⁵		
	Mean	Standard Deviation	N ⁶	Mean	Standard Deviation	N ⁶	Mean	Standard Deviation	N ⁶	Mean	Standard Deviation	N ⁶
LGI Overall												
(Divisions Only)	.54	.14	201	.60	.22	95	.54	.17	98	.52	.26	78
APD	.59	.11	71	.60	.21	30	.62	.18	37	.70	.18	35
CGD	.49	.15	64	.52	.27	31	.55	.16	33	.46	.31	23
IGD	.55	.14	66	.68	.19	34	.47	.17	28	.40	.16	20

¹See Figure VI-1 for scale definitions. Based on ten runs. Scales vary from 0 (no action taken) to 1 (action taken) on each problem.

²Problems on which action can be taken: APD, 12; CGD, 13; IGD, 12; LGI, 37. Mean - ratio of actions taken/number of problems on which action could be taken.

³CGD, six internal problems; APD and IGD, five.

⁴All divisions had six external problems.

⁵All divisions had five difficult problems.

⁶N is problems on which some action was taken.

Table VI-11
Capital Problems, Management Committee

	Decision Inclination ¹			Priority ²	
	Mean	Standard Deviation	N	Total Number Of Votes	Percent of Total Votes
Purchase Cascade	1.98	1.10	10	13	11.3%
Build New Capacitor Plant	2.82	.84	10	6	5.2%
Convert to All Electric Melters	2.25	1.77	2	24	20.9%
Increase Hourly Wages	3.14	.20	8	9	7.8%
Keep Integrated Circuits Plant	2.58	1.22	10	10	8.7%
Modernize Lighting Products Plant	3.21	.63	4	4	3.5%
Fund New Float Process	3.38	.48	4	14	12.2%
Convert Flat	3.17	.41	6	0	0.0%
Expand Flat Glass Plant	3.10	.57	8	8	7.0%
Consolidate Specialty & Glass Piping	2.79	.62	8	3	2.6%
Expand Auto	3.34	.36	8	17	14.8%
Modernize Auto	3.36	.48	7	7	6.1%
Continue Deepsea	1.84	.64	8	0	0.0%

¹The original scale was 1 - definitely no, 2 - leaning toward no, 3 - leaning toward yes, 4 - definitely yes, and 5 - don't know. These results are based only on those answering 1 through 4. For each run, all Management Committee members answering were averaged to create a run score. The "N" reflects the number of runs for which a run score could be created; an answer of 5 was treated as missing data.

²Each member of the Management Committee selected three of the thirteen capital problems as "most important to the long-term success of Looking Glass." These represent the total number of votes cast by the four members of the Management Committee across all ten runs.

Table VI-12
LGI Level: Use of Outside Information
By Telephone¹

	Mean Number Of Requests Per Person	Standard Deviation	Mean Number of Requests for Outside Information ²	Standard Deviation
LGI				
Level 1	1.72	1.70	.43	.75
Level 2	2.99	2.62	.54	.84
Level 3	5.32	3.86	1.59	1.51
APD				
Level 1	1.56	1.33	.50	.53
Level 2	3.19	2.65	.77	.94
Level 3	4.96	3.71	1.47	1.50
CGD				
Level 1	1.56	1.13	.40	.52
Level 2	2.74	2.21	.50	.82
Level 3	4.50	4.48	1.45	1.64
IGD				
Level 1	1.33	1.66	.10	.32
Level 2	3.04	3.02	.37	.72
Level 3	6.67	3.22	1.90	1.41
PRESIDENT	2.44	2.46	.70	1.25

¹ Level 1 - Vice-Presidents and President; Level 2 - Directors; Level 3 - Plant Managers. LGI - 20 people; APD, 7; CGD, 6; IGD, 6. Requests per person based on nine runs; requests per person from outside information notebook based on ten runs.

² Average number of requests per person for information contained in the outside information notebook.

Table VI-13
LGI Level:
Involvement in Key Decisions

	Number of People Involved						Standard Deviation	Mean ²	n ³
	One or Two n %	Three or Four n %	Five or More n %						
APD									
Level 1 ¹	29 46.8	31 50.0	2 3.2				2.13	1.12	62
Level 2	47 30.1	87 55.8	22 14.1				2.68	1.30	156
Level 3	27 25.7	54 51.4	24 22.9				2.94	1.40	105
CGD									
Level 1	23 42.6	22 40.7	9 16.7				2.48	1.46	54
Level 2	55 39.0	63 44.7	23 16.3				2.55	1.42	141
Level 3	25 33.8	37 50.0	12 16.2				2.65	1.38	74
IGD									
Level 1	28 48.3	25 43.1	5 8.6				2.21	1.30	58
Level 2	63 47.4	58 43.6	12 9.0				2.23	1.30	133
Level 3	35 61.4	20 35.1	2 3.5				1.84	1.13	57
LGI (Without PRES)									
Level 1	80 46.0	78 44.8	16 9.2				2.26	1.29	174
Level 2	165 38.4	208 48.4	57 13.3				2.50	1.35	430
Level 3	87 36.9	111 47.0	38 16.1				2.59	1.40	236

¹Level 1 - Attributions of Vice-Presidents, Level 2 - Attributions of Directors, Level 3 - Attributions of Plant Managers. Based on ten runs.

²To compute the mean, one or two = 1; three or four = 3; five or more = 5.

³N is only those who responded.

Table VI-14
LGI Level:
Attribution of Decision Responsibility
To Position - APD

<u>Position</u>	<u>Number of Attributions²</u>	<u>Percent of Attributions</u>	<u>Mean Number of Attributions</u>
VP-APD			
Level 1 ¹	29	33.7	2.9
Level 2	52	25.9	5.2
Level 3	26	15.9	2.6
DIR-S&M			
Level 1	11	12.7	1.1
Level 2	36	17.9	3.6
Level 3	25	15.2	2.5
DIR-MFG			
Level 1	18	20.9	1.8
Level 2	38	18.9	3.8
Level 3	35	21.3	3.5
DIR-PD			
Level 1	9	10.4	.9
Level 2	27	13.4	2.7
Level 3	16	9.8	1.6
PM-CAPACITORS			
Level 1	0	0.0	0.0
Level 2	11	5.5	1.1
Level 3	13	7.9	1.3
PM-INT CIRCUITS			
Level 1	3	3.5	.3
Level 2	7	3.5	.7
Level 3	20	12.2	2.0
PM-OPT FIBERS			
Level 1	0	0.0	0.0
Level 2	3	1.5	.3
Level 3	10	6.1	1.0
PRESIDENT			
Level 1	15	17.4	1.5
Level 2	22	10.9	2.2
Level 3	15	9.1	1.5
OTHERS			
Level 1	1	1.2	.1
Level 2	5	2.5	.5
Level 3	4	2.4	.4

¹Level 1 - Attributions of Vice-Presidents of APD, Level 2 - Attributions of Directors, Level 3 - Attributions of Plant Managers. Based on ten runs.

²N is only those who responded; ratings include self-ratings.

Table VI-15
LGI Level:
Attribution of Decision Responsibility
To Position - CGD

<u>Position</u>	<u>Number of Attributions²</u>	<u>Percent of Attributions</u>	<u>Mean Number of Attributions</u>
VP-CGD			
Level 1 ¹	24	39.3	2.4
Level 2	50	24.2	5.0
Level 3	23	20.4	2.3
DIR-S&M			
Level 1	12	19.7	1.2
Level 2	40	19.4	4.0
Level 3	13	11.5	1.3
DIR-MFG			
Level 1	9	14.8	.9
Level 2	43	20.9	4.3
Level 3	24	21.2	2.4
DIR-PD			
Level 1	5	8.2	.5
Level 2	39	18.9	3.9
Level 3	4	3.5	.4
PM-LIGHTING			
Level 1	0	0.0	0.0
Level 2	10	4.9	1.0
Level 3	21	18.6	2.1
PM-FLAT			
Level 1	0	0.0	0.0
Level 2	10	4.9	1.0
Level 3	20	17.7	2.0
PRESIDENT			
Level 1	9	14.8	.9
Level 2	9	4.4	.9
Level 3	5	4.4	.5
OTHERS			
Level 1	2	3.3	.2
Level 2	5	2.4	.5
Level 3	3	2.7	.3

¹Level 1 - Attributions of Vice-Presidents of CGD, Level 2 - Attributions of Directors, Level 3 - Attributions of Plant Managers. Based on ten runs.

²N is only those who responded; ratings include self-ratings.

Table VI-16
LGI Level:
Attribution of Decision Responsibility
To Position - IGD

<u>Position</u>	<u>Number of Attributions</u> ²	<u>Percent of Attributions</u>	<u>Mean Number of Attributions</u>
VP-IGD			
Level 1 ¹	40	39.6	4.0
Level 2	31	21.7	3.1
Level 3	4	5.5	.4
DIR-S&M			
Level 1	13	12.9	1.3
Level 2	24	16.8	2.4
Level 3	1	1.4	.1
DIR-MFG			
Level 1	20	19.8	2.0
Level 2	42	29.4	4.2
Level 3	23	31.5	2.3
DIR-PD			
Level 1	13	12.9	1.3
Level 2	17	11.9	1.7
Level 3	3	4.1	.3
PM-AUTO			
Level 1	5	5.0	.5
Level 2	17	11.9	1.7
Level 3	20	27.4	2.0
PM-SPECIALTY			
Level 1	3	3.0	.3
Level 2	3	2.1	.3
Level 3	18	24.7	1.8
PRESIDENT			
Level 1	6	5.9	.6
Level 2	5	3.5	.5
Level 3	1	1.4	.1
OTHERS			
Level 1	1	1.0	.1
Level 2	4	2.8	.4
Level 3	3	4.1	.3

¹Level 1 - Attributions of Vice-Presidents of IGD, Level 2 - Attributions of Directors, Level 3 - Attributions of Plant Managers. Based on ten runs.

²N is only those who responded; ratings include self-ratings.

Table VI-17
Banking vs. Manufacturing:
Information Diffusion¹

	<u>LGI</u>	<u>APD</u>	<u>CGD</u>	<u>IGD</u>
Average Diffusion				
Bank	.208	.145	.308	.148
MFG	.176	.120	.260	.128
Standard Deviation				
Bank	.061	.093	.062	.074
MFG	.040	.086	.053	.053
N				
Bank	4	4	4	4
MFG	5	5	5	5

¹Diffusion of information is calculated on the basis of exposures to selected information (see the information items in the Decision-Making Questionnaire for each division). The formula is:

$$\text{diffusion} = \frac{\text{exposures to information (from DMQ)} - \text{exposures at start}}{\text{total possible exposures} - \text{exposures at start}}$$

For LGI overall, the diffusion index ranges from a theoretical minimum of -.43 (negative scores represent a loss of information compared to the start) through 0 (the amount known at the end was the same as at the start) to 1 (everyone knew everything). For the divisions, the theoretical minimums are: APD, -.52; CGD, -.32; IGD, -.48.

Table VI-18
Banking vs. Manufacturing
Information Flow¹

	<u>LGI</u>	<u>APD</u>	<u>CGD</u>	<u>IGD</u>
Average Upward Flow ²				
Bank	.3925	.3900	.3775	.4075
MFG	.3580	.3460	.3580	.3680
Standard Deviation				
Bank	.0403	.0868	.0723	.0877
MFG	.0630	.1234	.1363	.0536
Average Downward Flow ³				
Bank	.2375	.2425	.3075	.1800
MFG	.2320	.2580	.2520	.1820
Standard Deviation				
Bank	.0971	.1008	.1668	.0577
MFG	.0110	.0804	.0327	.0444
Average Lateral Flow ⁴				
Bank	.1475	.0800	.1400	.1375
MFG	.1040	.0420	.1500	.0940
Standard Deviation				
Bank	.0263	.0337	.1068	.0499
MFG	.0336	.0390	.0500	.0586
Average Outside Info ⁵				
Bank	-	.3650	.2650	-
MFG	-	.3680	.2680	-
Standard Deviation				
Bank	-	.0695	.0723	-
MFG	-	.1038	.0614	-

¹Based on four banking and five manufacturing runs.

²Upward flow is indexed by tracking specific information bits. We know who has each bit at the start, the DMQ shows who knew what at the end. By looking at information held exclusively by lower levels at the start, it is possible to calculate how many higher level people were exposed to it at the end. Scores range from a minimum of 0 (no one at upper levels was exposed to information held at lower levels) to 1 (everyone at upper levels was exposed to all information held at lower levels).

³Downward flow is calculated in the same manner as upward flow, except looking at information held at the start by upper levels.

⁴Lateral flow indexes the amount of sharing of exclusive information among Directors and among Plant Managers. It also ranges from 0 to 1.

⁵For APD and CGD it is possible to calculate how many people were exposed to information outside of the divisions. Outside information = possible exposures - actual exposures/possible exposures (range, 0 to 1).

Table VI-21
Banking vs. Manufacturing:
Attribution of Decision Responsibility
To Positions - APD¹

Position	Number of Attributions ²	Percent of Attributions	Mean Number Of Attributions	Standard Deviation
VP-APD				
Bank	54	23.7	13.5	1.7
MFG	42	23.5	8.4	2.3
DIR-S&M				
Bank	30	13.2	7.5	4.4
MFG	36	20.1	7.2	3.8
DIR-MFG				
Bank	42	18.4	10.5	2.4
MFG	38	21.2	7.6	5.2
DIR-PD				
Bank	27	11.8	6.8	1.3
MFG	18	10.1	3.6	2.5
PM-CAPACITORS				
Bank	10	4.4	2.5	1.3
MFG	14	7.8	2.8	2.2
PM-INT CIRCUITS				
Bank	19	8.3	4.8	1.0
MFG	8	4.5	1.6	1.3
PM-OPT FIBERS				
Bank	12	5.3	3.0	2.6
MFG	0	0.0	0.0	0.0
PRESIDENT				
Bank	26	11.4	6.5	1.3
MFG	21	11.7	4.2	1.9
OTHERS				
Bank	8	3.5	2.0	.8
MFG	2	1.1	.4	.5

¹Based on four banking and five manufacturing runs.

²N is only those who responded; attributions include self-ratings.

Table VI-22
Banking vs. Manufacturing:
Attribution of Decision Responsibility
To Positions - CGD¹

<u>Position</u>	<u>Number of Attributions²</u>	<u>Percent of Attributions</u>	<u>Mean Number Of Attributions</u>	<u>Standard Deviation</u>
VP-CGD				
Bank	47	28.5	11.8	1.9
MFG	33	19.5	6.6	4.2
DIR-S&M				
Bank	24	14.5	6.0	4.3
MFG	37	21.9	7.4	3.4
DIR-MFG				
Bank	31	18.8	7.8	1.9
MFG	36	21.3	7.2	4.1
DIR-PD				
Bank	23	13.9	5.8	2.2
MFG	19	11.2	3.8	2.6
PM-LIGHTING				
Bank	13	7.9	3.3	3.8
MFG	15	8.9	3.0	3.2
PM-FLAT				
Bank	8	4.8	2.0	.8
MFG	17	10.1	3.4	1.1
PRESIDENT				
Bank	13	7.9	3.3	3.8
MFG	9	5.3	1.8	1.1
OTHERS				
Bank	6	3.6	1.5	.6
MFG	3	1.8	.6	.5

¹ Based on four banking and five manufacturing runs.

² N is only those who responded; attributions include self-ratings.

Table VI-23
Banking vs. Manufacturing:
Attribution of Decision Responsibility
To Positions - IGD¹

Position	Number of Attributions ²	Percent of Attributions	Mean Number Of Attributions	Standard Deviation
VP-IGD				
Bank	31	26.7	7.8	2.1
MFG	36	21.6	7.2	3.8
DIR-S&M				
Bank	13	11.2	3.3	1.3
MFG	21	12.6	4.2	1.5
DIR-MFG				
Bank	31	26.7	7.8	3.5
MFG	47	28.1	9.4	4.1
DIR-PD				
Bank	9	7.8	2.3	.5
MFG	22	13.2	4.4	3.8
PM-AUTO				
Bank	16	13.8	4.0	2.9
MFG	20	12.0	4.0	1.4
PM-SPECIALTY				
Bank	7	6.0	1.8	1.3
MFG	13	7.8	2.6	.5
PRESIDENT				
Bank	7	6.0	1.8	1.7
MFG	5	3.0	1.0	0.0
OTHERS				
Bank	2	1.7	.5	.6
MFG	3	1.8	.6	.9

¹Based on four banking and five manufacturing runs.

²N is only those who responded; attributions include self-ratings.

Table VI-24
Banking vs. Manufacturing:
Attribution of Decision Responsibility
To Positions - Management Committee¹

<u>Position</u>	<u>Number of Attributions²</u>	<u>Percent of Attributions</u>	<u>Mean Number Of Attributions</u>	<u>Standard Deviation</u>
PRESIDENT				
Bank	5	14.7	1.25	1.89
MFG	13	34.2	2.60	1.14
VP-APD				
Bank	4	11.8	1.00	.82
MFG	2	5.3	.40	.55
VP-CGD				
Bank	2	5.9	.50	1.00
MFG	2	5.3	.40	.55
VP-IGD				
Bank	3	8.8	.75	.96
MFG	10	26.3	2.00	1.87
JOINT DECISION				
Bank	14	41.2	3.50	1.29
MFG	9	23.7	1.80	1.30
VPS DECIDED				
Bank	4	11.8	1.00	.82
MFG	2	5.3	.40	.55
SOMEONE ELSE				
Bank	2	5.9	.50	1.00
MFG	0	0.0	0.00	0.00

¹ Based on four banking and five manufacturing runs.

² N is only those who responded; attributions include self-ratings.

Table VI-25
Banking vs. Manufacturing:
Decision-Making Scales
By Division and Overall¹

Scale	LGI		APD		CGD		IGD	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Problem Identification								
Bank	.5134	.0463	.4732	.0584	.6172	.0534	.4564	.0666
MFG	.4906	.0178	.4757	.0235	.5667	.0583	.4317	.0362
Maybe-It-Will-Go-Away								
Bank	.0787	.0094	.1131	.0248	.0479	.0042	.0694	.0292
MFG	.0802	.0168	.1000	.0363	.0617	.0247	.0756	.0241
Solution Expansion								
Bank	.0457	.0076	.0591	.0082	.0486	.0057	.0271	.0239
MFG	.0536	.0195	.0615	.0297	.0611	.0385	.0367	.0126
Decoupling								
Bank	.0269	.0037	.0119	.0137	.0417	.0321	.0298	.0357
MFG	.0370	.0206	.0286	.0261	.0361	.0211	.0476	.0445
Tactical								
Bank	.0991	.0031	.1044	.0078	.0962	.0314	.0958	.0308
MFG	.0870	.0205	.0802	.0307	.0885	.0516	.0933	.0308
Strategic								
Bank	.0824	.0281	.0913	.0417	.0759	.0433	.0787	.0221
MFG	.0904	.0236	.0995	.0512	.0857	.0439	.0844	.0414
Designer								
Bank	.0750	.0142	.1046	.0241	.0583	.0246	.0573	.0378
MFG	.0767	.0192	.0918	.0346	.0622	.0427	.0736	.0276
Investment								
Bank	.1139	.0414	.0643	.0502	.1071	.0825	.1786	.0456
MFG	.1251	.0335	.0743	.0634	.1048	.0769	.2048	.1311
Coupling								
Bank	.0438	.0162	.0286	.0286	.0324	.0093	.0729	.0361
MFG	.0474	.0182	.0343	.0078	.0519	.0422	.0583	.0401

¹ Based on four banking and five manufacturing runs. Scales vary from 0 (no decisions made) to 1 (all decisions made).

Table VI-26
Banking vs. Manufacturing:
Key Problem Handling
By Division and Overall¹

Scale	LGI			APD			CGD			IGD		
	Mean	Standard Deviation	N	Mean	Standard Deviation	N	Mean	Standard Deviation	N	Mean	Standard Deviation	N
Action Taken (All Problems) ²												
Bank	.55	.13	81	.58	.15	28	.54	.17	28	.52	.12	25
MFG	.52	.14	97	.60	.11	36	.45	.17	29	.53	.13	32
Action Taken (Internal) ³												
Bank	.58	.14	37	.65	.19	13	.54	.16	13	.55	.10	11
MFG	.60	.26	48	.60	.24	15	.50	.37	15	.72	.18	18
Action Taken (External) ⁴												
Bank	.57	.19	41	.58	.21	14	.63	.21	15	.50	.20	12
MFG	.51	.17	46	.63	.18	19	.47	.08	14	.43	.19	13
Action Taken (Difficult) ⁵												
Bank	.53	.25	32	.65	.19	13	.60	.33	12	.35	.19	7
MFG	.49	.27	37	.72	.23	18	.36	.39	9	.40	.14	10

¹See Figure VI-7 for scale definitions. Based on four banking and five manufacturing runs. Scales vary from 0 (no action taken) to 1 (action taken) on each problem.

²Problems on which action can be taken: LGI, 37; APD, 12; CGD, 13; IGD, 12. Mean - ratio of actions taken/number of problems on which action could be taken.

³CGD, six internal problems; APD and IGD, five.

⁴All divisions had six external problems.

⁵All divisions had five difficult problems.

Table VI-27
Capital Problems, Management Committee

	Decision Inclination ¹			Priority ²	
	<u>Mean</u>	<u>Standard Deviation</u>	<u>N</u>	<u>Total Votes</u>	<u>Percent Of Total Votes</u>
Purchase Cascade					
Bank	1.13	.25	4	3	6.3%
MFG	2.45	1.18	5	10	18.2%
Build New Capacitor Plant					
Bank	2.96	.48	4	3	6.3%
MFG	2.67	1.16	5	3	5.5%
Convert to All Electric Melters					
Bank	3.50	-	1	10	20.8%
MFG	-	-	0	10	18.2%
Increase Hourly Wages					
Bank	3.19	.24	4	4	8.3%
MFG	3.00	0.00	3	3	5.5%
Keep Integrated Circuits Plant					
Bank	2.46	1.13	4	3	6.3%
MFG	2.60	1.52	5	7	12.7%
Modernize Lighting Products Plant					
Bank	2.92	.59	2	3	6.3%
MFG	3.50	.71	2	1	1.8%

(Continued on Next Page)

Table VI-27
Capital Problems, Management Committee
(Continued)

	Decision Inclination ¹			Priority ²	
	Mean	Standard Deviation	N	Total Votes	Percent Of Total Votes
Fund New Float Process					
Bank	3.25	.35	2	8	16.7%
MFG	3.50	.71	2	3	5.5%
Convert Flat					
Bank	3.00	.00	3	0	0.0%
MFG	3.33	.58	3	0	0.0%
Expand Flat Glass Plant					
Bank	3.21	.25	4	3	6.3%
MFG	3.00	.82	4	3	5.5%
Consolidate Specialty and Glass Piping					
Bank	2.96	.52	4	0	0.0%
MFG	2.50	.87	3	2	3.6%
Expand Auto					
Bank	3.50	.43	4	7	14.6%
MFG	3.25	.25	3	10	18.2%
Modernize Auto Equipment					
Bank	3.38	.48	4	4	8.3%
MFG	3.50	.71	2	3	5.5%
Continue Deepsea					
Bank	2.00	.82	4	0	0.0%
MFG	1.69	.47	4	0	0.0%

¹The original scale was 1 - definitely no, 2 - leaning toward no, 3 - leaning toward yes, 4 - definitely yes, and 5 - don't know. These results are based only on those answering 1 through 4. For each run, all Management Committee members answering were averaged to create a run score. The "N" reflects the number of runs for which a run score could be created; an answer of 5 was treated as missing data.

²Each member of the Management Committee selected three of the thirteen capital problems as "most important to the long-term success of Looking Glass." These represent the total number of votes cast by the four members of the Management Committee across four banking and five manufacturing runs.

VII. PERFORMANCE

Introduction

...No definitive definition of organizational effectiveness can be given, the meaning of organizational effectiveness is not a truth buried somewhere waiting to be discovered if only our concepts and data collection methods were good enough...

The usefulness of a particular conceptualization is a function of both the values of the user and the facts of organizational life. Regardless of what theory is used, a value judgment must be made about what goals of the organization should be.

(Campbell, 1977, p. 15)

Campbell's view of organizational effectiveness applies equally well to evaluating performance in Looking Glass. Whether the evaluation is at an organizational, divisional, or individual level, it is basically a value judgment. It is, therefore, dependent on who is doing the judging and on what is being judged.

From the "who" perspective, the performance measures from Looking Glass involve three different groups: the designers of the simulation, the participants, and the outside "experts." The "what" perspective encompasses decision quality, financial outcomes, individual managerial effectiveness, and priority setting.

Some people also consider things like climate, information flow, power equalization, decision process, and the like, to be direct measures of effectiveness. These have been included in earlier sections of this report and will not be reviewed here.

Financial Outcomes

There are thirteen choices in Looking Glass that involve large dollar figures:

- purchasing Cascade Bottling (\$42 million)
- building a new capacitor plant (\$11 million)
- converting to all-electric melters (\$107 million)
- increasing hourly wages (\$7.5 million)

- selling the Integrated Circuits plant (\$5 million)
- modernizing the Lighting Products plant (\$2.75 million)
- funding float glass research (\$4.5 million)
- converting a line in the Flat Glass plant (\$6.95 million)
- expanding the Flat Glass plant (\$11.1 million)
- consolidating Specialty and Glass Piping plants (several million)
- expanding the Auto Glass plant (\$18 million)
- modernizing Auto Glass (\$2.7 million)
- continuing Project Deepsea (\$1.2 million)

In addition to these choices, Looking Glass has a number of opportunities (e.g., entering new markets) that will have an impact on its financial performance.

An estimate of Looking Glass's financial performance was constructed based on these choices and opportunities. Available data such as cost, impact on sales and operating costs, and financing were gathered as appropriate to the problem. Interrelationships among problems were identified and analyzed. Estimates of the impact of alternatives for each problem were derived, and a computer program was written.

Inputs to this program are drawn from the Management Committee Questionnaires and the analogous divisional questionnaires on which participants recorded their decisions on each of the problems. Since the problems have different time frames, effects on profits and opportunity costs are averaged over the life of each decision and reported as an annual figure.

Obviously no organization would make all of these decisions in a day (problems on which no decision was made were treated as if current practices continued), so the appropriate reference point is the range of results from the LGI norms.

Decision Quality

Decision quality was assessed in two ways: by scaling choices according to the designers' judgment and by asking the participants to rate their own performance. Both indexes were taken from the Decision-Making Questionnaires (DMQs) administered after each LGI run.

Scale scores for good and poor choices were created by classifying the decision choices on the DMQs (see Section VI for a description of the scale development procedures). Some choices were considered better or worse than others, so

a simple weighting system was developed to reflect those differences (a weight of 1 was assigned to good or bad choices, a weight of 2 to real winners or disasters). Both weighted and unweighted scores are reported.

The second measure of decision quality was self-report. After describing their actions on each problem in the DMQ, participants rated the quality of their decisions. These ratings were aggregated across problems and people to produce a "perceptions of quality" score.

At the end of the questionnaire participants also rated their overall performance as a business unit. Aggregating this rating across people resulted in a "global effectiveness" rating.

Self and Peer Ratings

The last part of each divisional DMQ asked participants to rate themselves and their fellow division members on their overall effectiveness as managers. They were also asked to rate the President and to indicate how much time they had spent with him or her. Presidents, in turn, rated themselves and each of the Vice-Presidents reporting to them.

Priorities

The divisional and Management Committee DMQs each contain a section listing a series of priorities and asking participants if they were recognized as priorities in LGI. These priorities (see Figures VII-1 to 4) were identified by the Board of Governors of the Center for Creative Leadership - a group consisting primarily of chairmen of the board, presidents, and high-level executives. Board members read the LGI materials and, in small group discussions, identified priorities for the corporation and its divisions. They also identified specific actions LGI managers might take to achieve those priorities. Priorities and actions were refined and written by the LGI designers and can be seen as one measure of effectiveness in LGI.

Priorities for the Advanced Products Division

PRIORITY 1

Develop a Sound Marketing Plan

APD's manufacturing problems are correctable. What begs for attention is how and to what markets goods should be marketed. Optical Fibers carries the division, making it look good on paper. Attempts to market integrated circuits and glass capacitors have ranged from marginally successful to disastrous.

PRIORITY 2

Develop a Control System

APD is haunted by poor planning and coordination of its systems. Raw materials wastage, high reject rates, inefficient energy use, theft, shipping/delivery snafus, a poor invoicing system and low sales force morale combine to snarl division operations and create cost overruns.

PRIORITY 3

Focus Resources on Innovations in Product Development and Marketing

The division produces goods far more efficiently than it sells them. It finds itself in a defensive position, cutting back when a line falters and then expanding when it succeeds. Such thinking will not work in an environment where products are outdated quickly. (Capacitors once sold well, prompting plans for expansion. Now, the market is shrinking.)

PRIORITY 4

Create a Better Internal Image for APD

Looking Glass treats APD as its favorite. Too much attention and too many resources are diverted to it.

PRIORITY 5

Revamp Personnel Policies

APD combines arbitrary personnel policies with fuzzy accountability to produce a loosely run structure.

PRIORITY 6Develop a Public Policy Stance

APD has taken a hostile stance against EEOC and EPA. It needs to behave more in a problem-solving mode.

Priorities for the Commercial Glass Division

PRIORITY 1

Prepare a Plan for the Future

Looking Glass is milking CGD while APD is getting all the corporate attention. The corporate posture needs to change. The division needs to develop a five-year plan focused on growth and cost reduction--a plan powerful enough to convince corporate to allocate more resources to CGD.

PRIORITY 2

Create a Divisional Offensive

CGD has developed an underdog psychology. There is a desperate need to take the offensive. The division is not innovative, does not take risks, and is losing people to other divisions. On the other hand, there is talent in the division and there are many market and product opportunities. A priority, then is to overcome the underdog image, both internally and as a means of getting corporate attention.

PRIORITY 3

Immediately Allocate Existing Resources to Maximize Growth and Reduce Costs

Available resources need to be focused where they can maximize growth and reduce costs. Immediate requests for more resources should focus on these objectives.

PRIORITY 4

Revamp Personnel Policies

Commercial Glass faces a number of problems, both immediately and in the near future, because of the ways it handles human resources.

PRIORITY 5

Avoid Seductive Pitfalls

Maximizing growth and cost reduction means using existing resources wisely and obtaining more resources. This

Avoid Seductive Pitfalls (continued)

requires lobbying against corporate actions that might drain resources and giving up projects that might be tangential.

Figure VII-2

Priorities for the Industrial Glass Division

PRIORITY 1

Decide on Financing New Capital Outlays

New opportunities in the auto market, replacing old equipment in the Auto Glass plant, and the possible consolidation of the Specialty and Glass Piping plants are some of IGD's alternatives that require considerable financial investment. However, investing in every possibility would require more capital outlay than is available.

PRIORITY 2

Emphasize Effectiveness of Product Development

Product Development's role in the division is practically in limbo. This is partly due to the inefficiency of some of its staff members, and partly due to its misunderstandings with top level management concerning its function. The profit picture at Specialty Glass is plagued by an uncertain market for its existing product lines (particularly aircraft and spacecraft windows), and innovative ideas for new products are needed. Other issues are the development of more flexible machinery for Glass Piping products (to meet more varied specification), and a workable scheme for converting to alternative energy sources.

PRIORITY 3

Devise a Plan to Improve the Division's Ability to Hold and Motivate Its Staff

IGD has been losing key personnel to APD. The division needs to create a more attractive working environment, since some staff members are obviously not satisfied with existing working conditions. A specific issue is how to get key IGD staff members to find the division an exciting place to work. In order for IGD to maintain its status as the financial backbone of Looking Glass, it must provide more rewarding opportunities for those staff members showing the greatest potential.

PRIORITY 4Push for Energy and Raw Materials Cost-Cutting Systems

The need to be more energy efficient is becoming critical. A sizable portion of divisional profits is eaten away by high energy costs. In addition, raw materials costs continue to increase, and cost-cutting mechanisms currently in use create quality problems.

Priorities for the Management Committee

PRIORITY 1

Internal Reorganization

Like many companies, Looking Glass has grown in response to successes and failures, with no overall plan for how the organization should be structured.

PRIORITY 2

Create a Corporate Offensive

Looking Glass has a history of cutting back when a line falters and expanding when it succeeds. This defensive strategy has created short time horizons and a limited number of products. The time has come to develop a corporate philosophy and push it.

PRIORITY 3

Revamp Personnel Policies

Looking Glass has a mixed bag of personnel policies and practices. APD and IGD have personnel departments at the plant level; Corporate takes care of CGD.

PRIORITY 4

Develop a Public Policy Stance

Looking Glass has continuing problems with EEOC, EPA, and OSHA due to its lack of focus on public policy.

HIGHLIGHTS

Financial Outcomes (Tables VII-1 - VII-3)

Table VII-1 shows the disposition of each of the thirteen problems involving major financial commitments. Among Management Committee members (collapsed over all ten runs) there was little consensus on which of the thirteen problems were "most important to the long term success of Looking Glass." The largest vote getter, converting to all electric melters as a response to energy costs and pollution problems, was named as a top priority by only 20.9% of the people. The next two most frequently cited issues were expanding the Auto Glass plant (14.8%) and funding float glass research (12.2%).

The last three columns of the table show what action was taken on each problem. A decision on selling Integrated Circuits was made in all ten runs, a decision on converting to all electric only once in ten runs (yet the latter was most often a top priority). There is a tendency for managers to decide "yes," or to defer a decision altogether (seven problems). Saying "no" was most common for the purchase of Cascade, the sale of Integrated Circuits, and continuing Project Deepsea.

The estimated financial impact of these decisions is summarized on Table VII-2. The table shows that on average LGI managers raised the return on investment (ROI) from 9.85% to 10.4%, incurred opportunity costs of \$13.1 million, and raised the debt to equity ratio from 49.6% to 65.7%. In terms of the LGI starting ratios, five groups lowered the initial ROI and five groups raised it.

A conservative estimate is that LGI can afford to raise the debt to equity ratio to 60% (participants had to figure this out for themselves). Five groups did not exceed the figure, five others did (on average, it was exceeded by 5.7%).

The means, standard deviations, and range of these results show that LGI runs varied considerably in their financial performance. They tended to improve the ROI by increasing debt.

On average, the manufacturing samples have out-performed the bank managers on these financial indicators, having a higher average return on investment and lower opportunity costs. As Table VII-3 shows, however, the ranges have

overlapped considerably. The bankers, in general, have been more conservative in increasing debt (three of the four banking runs had debt to equity ratios under the recommended maximum, only two of five manufacturing runs did).

Decision Quality (Tables VII-4 - VII-11)

Managers in LGI confront many more issues than the thirteen financially-loaded problems reported above. Table VII-4 reports scale scores for "good" and "poor" choices based on twelve or thirteen key problems in each of the three divisions. As these problems are different in each division, direct comparison of scale scores across divisions must be tentative.

"Good" choices reflect decisions coded by the LGI designers as acceptable responses to the problems. The weighted scale reflects our consensus judgment on the best of the better decisions. As is shown in Table VII-4, the divisions' scale scores are virtually identical on good choices.

"Poor" choices are decisions that are inappropriate for the problems and are also weighted to reflect the worst of the poor decisions. Here, IGD and CGD are virtually identical, while APD tends to make more of the possible poor choices.

Table VII-5 compares the banking and manufacturing samples on the good and poor choices scales. Overall the scores were virtually identical, with the manufacturing group having slightly higher scores on both scales. Looking at the weighted scales for the divisions, there was a tendency for manufacturing managers to make fewer poor choices and more good choices in CGD, while the bankers made fewer poor choices and more good choices in APD and IGD. Looking at good choices within groups, bankers performed approximately the same in all three divisions; manufacturing managers seem to flourish in the relatively stable environment of CGD.

Participants' perceptions of their own performance on the key problems in each division are reported in Tables VII-6, 7, and 8. After describing what they did on a problem, participants rated the quality of their decision. These ratings were aggregated across all problems and all division members. As Table VII-6 shows, the divisional ratings were quite similar and positive (about 3.6 on a 5-point scale). The Presidents were slightly more positive, the Management Committees less so.

Contrasting banking and manufacturing samples, Table VII-7 shows that, except for CGD, the bankers rated themselves more positively than manufacturing managers did. Table VII-8, showing the perceptions of different levels of LGI, reveals no consistent trends. Overall, there was a slight tendency for upper levels to view their performance less positively than lower levels did.

A final measure of quality was a global rating based on perceptions of effectiveness "as a business unit" (Tables VII-9, 10, and 11). The global ratings (Table VII-9) were lower than the specific ratings reported in the previous tables, and hovered around the mid-point of the 5-point scale. Again, bankers were more positive than manufacturing managers (Table VII-10) and level effects (Table VII-11) showed no consistent patterns.

Table VI-4 showed that in IGD decisions were made primarily at upper levels and by one or two people. Table VII-11 may be interpretable in light of this. In APD and CGD, where decision-making involved more people at lower levels, the perceived performance is higher at lower levels and lower at upper levels. This reverses in IGD. Involvement in decision-making apparently increases one's belief that the decisions were of high quality. Delegating tends to reduce that belief.

Self and Peer Ratings (Tables VII-12 - VII-21)

Tables VII-12, 14, and 16 report the overall self and peer ratings for each position in each division of LGI. The results are interesting when interpreted against the overall power rankings reported in Section V. For the two most powerful positions in each division (Vice-President and Director of Manufacturing), self-rating was always lower than the peer rating. For the least powerful positions (Plant Managers), the self-rating was nearly always higher than the peer rating. Perhaps those with more power in organizations can afford to be more humble. In any case, peer ratings are not consistently higher or lower than self-ratings across positions.

Manufacturing managers' peer ratings, as contrasted with bankers', are generally lower (14 out of 19 comparisons, Tables VII-13, 15, and 17). Self-ratings also tended to be lower for manufacturing managers, but not as consistently (11 of 19 comparisons).

The Presidents' ratings of the Vice-Presidents (Tables VII-18 and 19) showed the VP-APD as the most effective of the three, regardless of sample. The highest variance in effectiveness ratings was for the VP-IGD.

Tables VII-20 and 21 show ratings of LGI Presidents by members of the organization. Overall (Table VII-20) the Presidents' self-rating is higher than any group of peer ratings. Those spending "a little time" with the President rated him or her highest, those spending "considerable time" with him or her had the most variability in ratings.

Banking/manufacturing comparisons (Table VII-21) show that Presidents of LGI drawn from manufacturing organizations rated themselves lower than their counterparts from the bank. Further, the less time peers spent with manufacturing Presidents, the lower their ratings of him or her.

Priorities (Tables VII-22 - VII-32)

Two additional indicators of performance might be 1) whether or not the priorities identified by outside experts were established by LGI managers and 2) regardless of the priorities established, the extent to which the priorities were shared among managers. Tables VII-22 - VII-32 report these data for each division and for the Management Committee.

In volatile APD, no more than 27.3% of the managers identified any of the six possible priorities as "clearly established" (Table VII-22). The two most frequent priorities were developing a sound marketing plan (26.1%) and revamping personnel policies (27.3%). The least often established priority was improving the divisions' internal image (7.8%).

These results take on an entirely different flavor when banking and manufacturing samples are compared (Table VII-23). While both place priority on a marketing plan, bankers tended to emphasize developing a control system (28.6% vs. 8.8%), a better internal image (16% vs. 3.1%), personnel policies (50% vs. 6.1%), and public policy (25.9% vs. 15.6%). Manufacturing managers emphasized allocating resources to Product Development and Marketing (21.2% vs. 7.7%).

Level effects in APD (Table VII-24) were inconsistent. Public policy and internal image, when established at all, were apparent at higher levels but less so at lower levels. Marketing, control systems, and resources to Product Development and Marketing more often appeared at the Director level

and less often above or below. Personnel policies were most often identified as a clear priority at the lowest levels, least often at the highest.

In CGD, the stable division, there were clear priorities more often. Preparing a plan and growth/cost reduction were clear priorities according to 44.8% and 43.9% of the CGD managers respectively (Table VII-25). Personnel policies were least often a clear priority (13.8%). Unlike APD, the comparison of banking and manufacturing managers (Table VII-26) did not reveal dramatic reversals. Far more banking managers saw the priorities as clear, but the relative ranking remained similar in the two groups.

As in APD, level of management in CGD was related in different ways to priorities. Preparing a plan and avoiding pitfalls were priorities at upper levels but less clear at lower levels. Growth/cost reduction and personnel policies were clear at lower levels and less clear at upper. Creating a divisional offensive was more clear to Directors than to either other level (Table VII-27).

IGD, the schizophrenic division, clearly established cost cutting as a priority (52.6%) and avoided dealing with staff motivation (7.5%) (Table VII-28). As in CGD, banking managers more often saw the priorities as clear, but the relative order of priorities was similar for both banking and manufacturing managers (Table VII-29). As in the other divisions, level effects varied by priority (Table VII-30). Financing new capital outlays and emphasizing Product Development were priorities at upper levels and less so at lower levels. Cost cutting was a priority at lower levels, less so at the top. The few people concerned with staff motivation were at the Director and Vice-President levels.

The final set of tables deals with priorities as seen by the members of LGI Management Committees. Public policy was seen as a clear priority by 33.3%; reorganization, creating an offensive, and personnel by 27.5%, 26.3%, and 25.6% respectively (Table VII-31). For banking managers, the most widely known priority was creating a corporate offensive (quit cutting back when a line falters and expanding when it succeeds), recognized by 46.7% (Table VII-32). Manufacturing managers' most widely known priority was public policy (31.6%). Manufacturing managers generally saw fewer clear priorities.

Overall there was considerable variation in LGI and its divisions in terms of priorities set and communication of those priorities. APD seemed to be the most unpredictable division, with fewer people seeing clear priorities and dramatically different profiles for banking and manufacturing

managers. Fewer manufacturing managers, in general, said that the experts' priorities had been clearly established.

Summary

As in any real organization, performance in Looking Glass is multifaceted. This section has shown that there are several viable performance measures in Looking Glass and there is substantial variation in performance across runs, divisions, and samples. As was stated in the introduction to this section, evaluation of performance is, ultimately, a subjective judgment. The weight one might apply to financial outcomes, objective and subjective decision quality, peer and self-ratings, or priority setting should depend on the purpose of the evaluation and the limitations of each measure.

In an attempt to understand how divisional performance related to LGI's financial performance, we correlated the weighted good and poor choices scales with ROI. The results are reported below:

	ROI
APD good choices	.34
APD poor choices	-.69*
CGD good choices	.78*
CGD poor choices	.33
IGD good choices	-.27
IGD poor choices	-.07

* $p < .05$

For these ten runs of LGI, the highest return on investment accrued when APD made fewer blunders and CGD made more good decisions. IGD's performance had little effect on ROI. This is interesting because one might expect ROI to be positively related to good choices in all the divisions and negatively related to poor choices. One explanation of the findings is that resources are limited in LGI; the highest payoff comes from investing in the stable and growing markets of the Commercial Glass Division while avoiding the risky possibilities in the unpredictable Advanced Products Division.

Table VII-1
Management Committee Decisions¹

	Percent of Votes as One Of Top 3 Priorities ²	Priority Rank	Number of Times Decided Yes	Number of Times Decided No	Number of Times Not Decided
Purchase Cascade Bottling	11.3%	4	2	6	2
Build New Capacitor Plant	5.2%	9	4	2	4
Convert to All-Electric Melters	20.9%	1	1	0	9
Increase Hourly Wages	7.8%	6	3	0	7
Sell Integrated Circuits	8.7%	5	5	5	0
Modernize Lighting Products	3.5%	10	3	0	7
Fund Float Glass Research	12.2%	3	3	0	7
Convert Line at Flat	0.0%	12.5	4	0	6
Expand Flat Glass	7.0%	7	6	0	4
Consolidate Specialty & Glass Piping	2.6%	11	5	1	4
Expand Auto Glass	14.8%	2	7	0	3
Modernize Auto Glass	6.1%	8	4	0	6
Continue Project Deepsea	0.0%	12.5	0	4	6

¹ Based on Management Committee Decision-Making Questionnaires from ten runs.

² Based on total votes cast by all members of the Management Committee in all runs (n = 40).

Table VII-2
Financial Performance of Looking Glass¹

	<u>Mean</u>	<u>Standard Deviation</u>	<u>Range</u>
Return on Investment ²	10.4%	2.09	8.1-13.4
Opportunity Costs ³	\$13.1	4.45	3.6-18.3
Debt-to-Equity Ratio ⁴	65.7%	17.7	49.6-92.0

¹These figures are based on decisions made on thirteen problems involving large financial commitments. They are based on ten runs. The outcomes are calculated for an average year with all decisions in effect.

²ROI is net income/equity. LGI starts with an ROI of 9.85%.

³Opportunity costs reflect the profit sacrificed by not taking advantage of new opportunities. These numbers are millions of dollars and would be 0 if every opportunity were taken.

⁴Calculated as long-term liabilities/(capital stock and retained earnings). LGI starts with a debt-to-equity ratio of 49.6%. A conservative estimate is that LGI can invest \$17.5 million through stock, \$12.5 million through debt, or a total of \$30 million. This would raise the debt-to-equity ratio to 60%.

Table VII-3
Banking vs. Manufacturing:
Financial Performance of Looking Glass¹

	ROI ²		OC		D/E	
	<u>Mean</u>	<u>Range</u>	<u>Mean</u>	<u>Range</u>	<u>Mean</u>	<u>Range</u>
LGI at Start	9.85	-	0	-	49.60	-
Banking	9.47	8.8-11.68	15.05	13.62-16.67	60.15	49.6-87.3
Manufacturing	10.83	8.1-12.60	10.99	7.50-18.26	73.40	52.2-92.0

¹Based on four banking and five manufacturing runs.

²See Table VII-2 for definitions of these terms.

Table VII-4
Decision Quality Scales

Division	Poor Choices ¹			Good Choices ²		
	Unweighted		Weighted	Unweighted		Weighted
	Mean	Standard Deviation	Mean	Mean	Standard Deviation	Mean
APD	.0727	.0701	.1325	.1054	.0319	.1421
CGD	.0393	.0216	.0547	.0989	.0383	.1544
IGD	.0429	.0170	.0631	.1057	.0364	.1435
LGI	.0527	.0255	.0860	.1034	.0211	.1465

Based on ten runs of LGI.

¹The extent to which decision choices represent poor solutions to the problems. Keyed items represent choices which, in our judgment, are likely to result in serious negative consequences for the division or the company as a whole. We recognize that any particular group may have reasons for the decision that would make it a good choice. In general, however, keyed items are inferior choices in that other decisions are more likely to solve the problems. Since some choices were clearly worse than others, we used a consensus judgment process to assign weights to each decision choice (1 - moderately poor, 2 - very poor).

²The extent to which chosen solutions are in line with staff judgments of the best choices for the problems. Again, weights were assigned on a consensus basis, 1 to moderately good choices, 2 to optimal choices.

Table VII-5
Banking vs. Manufacturing:
Decision Quality Scales

Division	Poor Choices ¹			Good Choices ²		
	Unweighted		Weighted	Unweighted		Weighted
	Mean	Standard Deviation		Mean	Standard Deviation	
APD						
Bank	.0747	.0803	.1299	.1134	.0194	.1446
MFG	.0753	.0781	.1403	.1000	.0436	.1357
CGD						
Bank	.0483	.0319	.0633	.0917	.0190	.1444
MFG	.0347	.0119	.0507	.1111	.0503	.1711
IGD						
Bank	.0327	.0150	.0536	.1047	.0102	.1474
MFG	.0500	.0177	.0714	.1049	.0537	.1390
LGI						
Bank	.0531	.0332	.0848	.1038	.0113	.1454
MFG	.0545	.0247	.0902	.1051	.0296	.1479
						.0451

Based on four banking and five manufacturing runs.

¹The extent to which decision choices represent poor solutions to the problems. Keyed items represent choices which, in our judgment, are likely to result in serious negative consequences for the division or the company as a whole. We recognize that any particular group may have reasons for the decision that would make it a good choice. In general, however, keyed items are inferior choices in that other decisions are more likely to solve the problems. Since some choices were clearly worse than others, we used a consensus judgment process to assign weights to each decision choice (1 - moderately poor, 2 - very poor).

²The extent to which chosen solutions are in line with staff judgments of the best choices for the problems. Again, weights were assigned on a consensus basis, 1 to moderately good choices, 2 to optimal choices.

Table VII-6
Perceptions of Decision Quality
Across Key Problems¹

	<u>Mean</u>	<u>Standard Deviation</u>	<u>N</u>
APD	3.64	.17	10
CGD	3.65	.26	10
IGD	3.69	.17	10
PRESIDENT	3.72	.55	9
MANAGEMENT COMMITTEE	3.49	.40	10
LGI	3.66	.08	10

¹Based on average ratings of each problem on which action was taken (there are 12 possible problems in APD and IGD, 13 in CGD). Scale ran from 1 (extremely poor business decision) to 5 (extremely good business decision).

Table VII-7
Banking vs. Manufacturing:
Perceptions of Decision Quality
Across Key Problems¹

	<u>Mean</u>	<u>Standard Deviation</u>	<u>N</u>
APD			
Bank	3.70	.10	4
MFG	3.58	.23	5
CGD			
Bank	3.67	.13	4
MFG	3.71	.30	5
IGD			
Bank	3.78	.11	4
MFG	3.58	.18	5
PRESIDENT			
Bank	3.82	.21	4
MFG	3.65	.74	5
MANAGEMENT COMMITTEE			
Bank	3.58	.21	4
MFG	3.52	.51	5
LGI			
Bank	3.71	.08	4
MFG	3.63	.07	5

¹Based on average ratings of each problem on which action was taken (there are 12 possible problems in APD and IGD, 13 in CGD). Scale ran from 1 (extremely poor business decision) to 5 (extremely good business decision).

Table VII-8
LGI Level:
Perceptions of Decision Quality
Across Key Problems¹

	<u>Mean</u>	<u>Standard Deviation</u>	<u>N</u>
APD			
Level 1 ²	3.56	.66	64
Level 2	3.70	.69	155
Level 3	3.61	.71	109
CGD			
Level 1	3.45	.85	56
Level 2	3.67	.80	146
Level 3	3.76	.85	76
IGD			
Level 1	3.80	.61	60
Level 2	3.57	.70	134
Level 3	3.88	.83	60
LGI			
Level 1	3.61	.72	205
Level 2	3.65	.73	435
Level 3	3.72	.79	245

¹Based on average ratings of each problem on which action was taken (there are 12 possible problems in APD and IGD, 13 in CGD). Scale ran from 1 (extremely poor business decision) to 5 (extremely good business decision).

²Level 1 - Vice-Presidents (and President for LGI overall)
Level 2 - Directors
Level 3 - Plant Managers

Table VII-9
Global Self-Assessment of Effectiveness
As a Business Unit¹

	<u>Mean</u>	<u>Standard Deviation</u>	<u>N</u>
APD	3.17	.39	10
CGD	3.04	.48	10
IGD	2.93	.42	10
PRESIDENT	3.67	1.00	9

¹Based on the following item: How effectively do you think your division as a whole operated today? In other words, how effective a business unit was (APD, CGD, IGD, LGI)? Response choices were:
1 - ineffective; 2 - neither effective nor ineffective; 3 - moderately effective; 4 - effective; 5 - extremely effective.

Table VII-10
 Banking vs. Manufacturing:
 Global Self-Assessment of Effectiveness
 As a Business Unit¹

	<u>Mean</u>	<u>Standard Deviation</u>	<u>N</u>
APD			
Bank	3.39	.21	4
MFG	3.09	.45	5
CGD			
Bank	3.33	.44	4
MFG	2.89	.47	5
IGD			
Bank	3.17	.36	4
MFG	2.73	.45	5
PRESIDENT			
Bank	3.75	1.26	4
MFG	3.25	.50	4

¹Based on the following item: How effectively do you think your division as a whole operated today? In other words, how effective a business unit was (APD, CGD, IGD, LGI)? Response choices were:
 1 - ineffective; 2 - neither effective nor ineffective; 3 - moderately effective; 4 - effective; 5 - extremely effective.

Table VII-11
LGI Level:
Global Self-Assessment of Effectiveness
As a Business Unit¹

	<u>Mean</u>	<u>Standard Deviation</u>	<u>N</u>
APD			
Level 1 ²	2.70	.95	10
Level 2	3.20	.89	30
Level 3	3.30	.88	30
CGD			
Level 1	2.30	1.42	10
Level 2	3.23	.90	30
Level 3	3.11	.83	18
IGD			
Level 1	3.40	.70	10
Level 2	2.87	.68	30
Level 3	2.80	1.11	20

¹Based on the following item: How effectively do you think your division as a whole operated today? In other words, how effective a business unit was (APD, CGD, IGD)? Response choices were:
1 - ineffective; 2 - neither effective nor ineffective; 3 - moderately effective; 4 - effective; 5 - extremely effective.

²Level 1 - Vice-Presidents (and President for LGI overall)
Level 2 - Directors
Level 3 - Plant Managers

Table VII-12
Self and Peer Performance
Ratings - APD¹

<u>Position</u>	<u>S e l f - R a t i n g</u>			<u>P e e r R a t i n g</u> ²		
	<u>Mean</u>	<u>Standard Deviation</u>	<u>N</u>	<u>Mean</u>	<u>Standard Deviation</u>	<u>N</u>
VP	3.00	.87	9	3.66	.27	10
DIR-MFG	3.30	1.16	10	3.85	.44	10
DIR-S&M	3.22	.83	9	3.18	.30	10
DIR-PD	3.20	1.03	10	2.96	.68	10
PM-CAPACITORS	3.78	.83	9	3.39	.30	10
PM-OPT FIBERS	3.56	.53	9	3.59	.36	10
PM-INT CIRCUITS	3.80	.63	10	3.31	.36	10

¹Based on the following item: On the basis of what you saw today and given the demands of the position each person had, how effective was each person as a manager? Responses were: 1 - ineffective; 2 - neither effective nor ineffective; 3 - moderately effective; 4 - effective; 5 - extremely effective.

²In APD, there were six peers, five in CGD and IGD.

Table VII-13
Banking vs. Manufacturing:
Self and Peer Performance
Ratings - APD¹

<u>Position</u>	<u>S e l f - R a t i n g</u>		<u>P e e r R a t i n g</u> ²	
	<u>Mean</u>	<u>Standard Deviation</u>	<u>Mean</u>	<u>Standard Deviation</u>
VP				
Bank	3.25	.50	3.81	.36
MFG	3.25	.50	3.54	.17
DIR-MFG				
Bank	3.75	.96	3.79	.34
MFG	2.80	1.30	3.90	.58
DIR-S&M				
Bank	3.00	1.00	3.07	.30
MFG	3.20	.84	3.17	.26
DIR-PD				
Bank	3.50	1.00	3.22	.61
MFG	2.80	1.10	2.85	.79
PM-CAPACITORS				
Bank	3.50	1.00	3.53	.31
MFG	4.25	.50	3.35	.26
PM-OPT FIBERS				
Bank	3.33	.58	3.38	.43
MFG	3.60	.55	3.22	.36
PM-INT CIRCUITS				
Bank	4.25	.50	3.71	.28
MFG	3.60	.55	3.61	.37

¹Based on the following item: On the basis of what you saw today and given the demands of the position each person had, how effective was each person as a manager? Responses were: 1 - ineffective; 2 - neither effective nor ineffective; 3 - moderately effective; 4 - effective; 5 - extremely effective.

²In APD, there were six peers, five in CGD and IGD.

Table VII-14
Self and Peer Performance
Ratings - CGD¹

<u>Position</u>	<u>S e l f - R a t i n g</u>			<u>P e e r R a t i n g</u> ²		
	<u>Mean</u>	<u>Standard Deviation</u>	<u>N</u>	<u>Mean</u>	<u>Standard Deviation</u>	<u>N</u>
VP	2.60	1.51	10	3.33	.56	10
DIR-MFG	3.00	1.23	9	3.46	.40	10
DIR-S&M	3.30	.48	10	3.39	.41	10
DIR-PD	3.40	.52	10	3.04	.64	10
PM-FLAT	3.38	1.19	8	3.18	.74	10
PM-LIGHTING	3.60	.70	10	3.11	.67	10

¹Based on the following item: On the basis of what you saw today and given the demands of the position each person had, how effective was each person as a manager? Responses were: 1 - ineffective; 2 - neither effective nor ineffective; 3 - moderately effective; 4 - effective; 5 - extremely effective.

²In APD, there were six peers, five in CGD and IGD.

Table VII-15
Banking vs. Manufacturing:
Self and Peer Performance
Ratings - CGD¹

<u>Position</u>	<u>S e l f - R a t i n g</u>		<u>P e e r R a t i n g</u> ²	
	<u>Mean</u>	<u>Standard Deviation</u>	<u>Mean</u>	<u>Standard Deviation</u>
VP				
Bank	3.00	1.41	3.51	.24
MFG	2.60	1.67	3.00	.55
DIR-MFG				
Bank	2.50	1.73	3.45	.68
MFG	3.25	.50	3.48	.11
DIR-S&M				
Bank	3.75	.50	3.55	.47
MFG	3.00	0.00	3.30	.40
DIR-PD				
Bank	3.75	.50	3.35	.50
MFG	3.20	.45	2.75	.72
PM-FLAT				
Bank	3.25	1.71	3.11	1.13
MFG	3.67	.58	3.30	.48
PM-LIGHTING				
Bank	3.75	.50	3.54	.42
MFG	3.80	.45	3.03	.51

¹Based on the following item: On the basis of what you saw today and given the demands of the position each person had, how effective was each person as a manager? Responses were: 1 - ineffective; 2 - neither effective nor ineffective; 3 - moderately effective; 4 - effective; 5 - extremely effective.

²In APD, there were six peers, five in CGD and IGD.

Table VII-16
Self and Peer Performance
Ratings - IGD¹

<u>Position</u>	<u>S e l f - R a t i n g</u>			<u>P e e r R a t i n g</u> ²		
	<u>Mean</u>	<u>Standard Deviation</u>	<u>N</u>	<u>Mean</u>	<u>Standard Deviation</u>	<u>N</u>
VP	3.30	.68	10	3.34	.41	10
DIR-MFG	3.40	.70	10	3.64	.65	10
DIR-S&M	3.11	.60	9	3.15	.62	10
DIR-PD	2.50	1.08	10	3.02	.51	10
PM-AUTO	3.40	.70	10	3.21	.44	10
PM-SPECIALTY	3.50	.85	10	2.97	.46	10

¹Based on the following item: On the basis of what you saw today and given the demands of the position each person had, how effective was each person as a manager? Responses were: 1 - ineffective; 2 - neither effective nor ineffective; 3 - moderately effective; 4 - effective; 5 - extremely effective.

²In APD, there were six peers, five in CGD and IGD.

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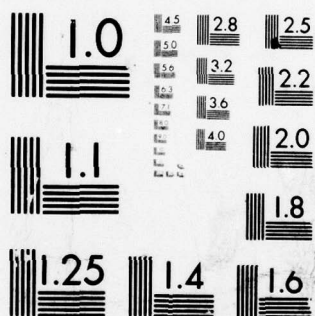
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Table VII-17
Banking vs. Manufacturing:
Self and Peer Performance
Ratings - IGD¹

<u>Position</u>	<u>S e l f - R a t i n g</u>		<u>P e e r R a t i n g</u> ²	
	<u>Mean</u>	<u>Standard Deviation</u>	<u>Mean</u>	<u>Standard Deviation</u>
VP				
Bank	3.25	.50	3.70	.24
MFG	3.60	.55	3.07	.32
DIR-MFG				
Bank	3.50	.58	3.90	.42
MFG	3.20	.84	3.56	.80
DIR-S&M				
Bank	3.33	.58	3.64	.16
MFG	3.20	.45	2.71	.58
DIR-PD				
Bank	3.00	1.16	3.06	.21
MFG	2.00	1.00	2.82	.59
PM-AUTO				
Bank	3.50	.58	3.37	.57
MFG	3.40	.89	3.02	.32
PM-SPECIALTY				
Bank	3.75	.50	3.26	.44
MFG	3.00	.71	2.67	.33

¹Based on the following item: On the basis of what you saw today and given the demands of the position each person had, how effective was each person as a manager? Responses were: 1 - ineffective; 2 - neither effective nor ineffective; 3 - moderately effective; 4 - effective; 5 - extremely effective.

²In APD, there were six peers, five in CGD and IGD.

Table VII-18
Presidents' Perceptions
Of Effectiveness of VPs¹

	<u>Mean</u>	<u>Standard Deviation</u>	<u>N</u>
VP-APD	3.80	.63	10
VP-CGD	3.30	.68	10
VP-IGD	3.44	1.24	9

¹Based on the following item: On the basis of what you saw today and given the demands of the position each person had, how effective was each person as a manager? Responses were: 1 - ineffective; 2 - neither effective nor ineffective; 3 - moderately effective; 4 - effective; 5 - extremely effective.

Table VII-19
Banking vs. Manufacturing:
Presidents' Perceptions
Of Effectiveness of VPs¹

	<u>Mean</u>	<u>Standard Deviation</u>	<u>N</u>
VP-APD			
Bank	3.75	.50	4
MFG	3.80	.84	5
VP-CGD			
Bank	3.25	.96	4
MFG	3.20	.45	5
VP-IGD			
Bank	3.00	1.41	4
MFG	3.50	1.00	4

¹Based on the following item: On the basis of what you saw today and given the demands of the position each person had, how effective was each person as a manager? Responses were: 1 - ineffective; 2 - neither effective nor ineffective; 3 - moderately effective; 4 - effective; 5 - extremely effective.

Table VII-20
Self and Peer Ratings
Of Presidents' Performance¹

	<u>Mean</u>	<u>Standard Deviation</u>	<u>N</u>
Presidents' Self-Rating	3.71	.49	7
Rating of President By Those Spending "Considerable Time" With Him/Her	3.30	1.06	10
Rating of President By Those Spending "A Little Time" With Him/Her	3.42	.64	10
Rating of President By Those Who "Never Interacted" With Him/Her	3.30	.43	10

¹Participants indicated how much time they spent with the President (considerable, a little, never interacted) and rated him or her on a 5-point scale: 1 - ineffective; 2 - neither effective nor ineffective; 3 - moderately effective; 4 - effective; 5 - extremely effective. There were 19 peers in each run.

Table VII-21
Banking vs. Manufacturing:
Self and Peer Ratings
Of Presidents' Performance¹

	<u>Mean</u>	<u>Standard Deviation</u>	<u>N</u>
Presidents' Self-Rating			
Bank	4.00	.00	4
MFG	3.33	.58	3
Rating of President By Those Spending "Considerable Time" With Him/Her			
Bank	3.75	.29	4
MFG	3.40	.96	5
Rating of President By Those Spending "A Little Time" With Him/Her			
Bank	3.90	.61	4
MFG	3.25	.34	5
Rating of President By Those Who "Never Interacted" With Him/Her			
Bank	3.65	.35	4
MFG	3.01	.29	5

¹Participants indicated how much time they spent with the President (considerable, a little, never interacted) and rated him or her on a 5-point scale: 1 - ineffective; 2 - neither effective nor ineffective; 3 - moderately effective; 4 - effective; 5 - extremely effective. There were 19 peers in each run.

Table VII-22
Identification of Priorities in APD

	F r e q u e n c y D i s t r i b u t i o n							
	Not a Priority(1)		Unclear(2)		A Clear Priority(3)		Standard Deviation	N
	<u>N</u>	<u>Percent</u>	<u>N</u>	<u>Percent</u>	<u>N</u>	<u>Percent</u>		
Develop Sound Marketing Plan	16	23.2	35	50.7	18	26.1	2.04	10
Develop Control System	16	23.2	42	60.9	11	15.9	1.93	10
Focus on Resources in PD and Marketing	25	37.9	31	47.0	10	15.2	1.79	10
Create Better Internal Image for APD	32	50.0	27	42.2	5	7.8	1.58	10
Revamp Personnel Policies	23	34.8	25	37.9	18	27.3	1.91	10
Develop Public Policy Stance	25	37.9	28	42.4	13	19.7	1.81	10

Table VII-24
LGI Level:
Identification of Priorities in APD

	Frequency Distribution					
	Not a Priority(1)		Unclear(2)		A Clear Priority(3)	
	N	Percent	N	Percent	N	Percent
Develop Sound Marketing Plan						
Level 1 ¹	4	40.0	4	40.0	2	20.0
Level 2	5	16.7	13	43.3	12	40.0
Level 3	7	24.1	18	62.1	4	13.8
Develop Control System						
Level 1	4	40.0	5	50.0	1	10.0
Level 2	6	20.0	17	56.7	7	23.3
Level 3	6	20.7	20	69.0	3	10.3
Focus on Resources in PD and Marketing						
Level 1	5	50.0	3	30.0	1	10.0
Level 2	11	37.9	12	41.4	6	20.7
Level 3	9	32.1	16	57.1	3	10.7
Create Better Internal Image for APD						
Level 1	5	50.0	3	30.0	2	20.0
Level 2	15	51.7	11	37.9	3	10.3
Level 3	12	48.0	13	52.0	0	00.0
Revamp Personnel Policies						
Level 1	8	80.0	0	00.0	2	20.0
Level 2	9	32.1	12	42.9	7	25.0
Level 3	6	21.4	13	46.4	9	32.1
Develop Public Policy Stance						
Level 1	3	30.0	4	40.0	3	30.0
Level 2	10	34.5	13	44.8	6	20.7
Level 3	12	44.4	11	40.7	4	14.8

¹Level 1 - Vice-Presidents, Level 2 - Directors, Level 3 - Plant Managers. Based on ten runs.

Table VII-25
Identification of Priorities in CGD

	F r e q u e n c y D i s t r i b u t i o n							
	<u>Not a Priority(1)</u>		<u>Unclear(2)</u>		<u>A Clear Priority(3)</u>			
	<u>N</u>	<u>Percent</u>	<u>N</u>	<u>Percent</u>	<u>N</u>	<u>Percent</u>	<u>Mean</u>	<u>Standard Deviation</u>
Prepare Plan for Future	10	17.2	22	37.9	26	44.8	2.27	.48
Create Divisional Offensive	16	27.6	25	43.1	17	28.3	2.02	.41
Immediately Allocate Existing Resources to Maximize Growth and Reduce Costs	7	12.3	25	43.9	25	43.9	2.32	.38
Revamp Personnel Policies	28	48.3	22	37.9	8	13.8	1.64	.37
Avoid Seductive Pitfalls	20	35.7	27	48.2	9	16.1	1.78	.29

Table VII-26
Banking vs. Manufacturing:
Identification of Priorities in CGD

Frequency Distribution									
Not a Priority(1) Unclear(2) A Clear Priority(3)									
	N	Percent	N	Percent	N	Percent	Mean	Standard Deviation	N
Prepare Plan for Future									
Bank	3	13.6	9	40.9	10	45.5	2.31	.61	4
MFG	7	23.3	13	43.3	10	33.3	2.10	.28	5
Create Divisional Offensive									
Bank	6	26.1	10	43.5	7	30.4	2.04	.34	4
MFG	10	34.5	14	48.3	5	17.2	1.84	.27	5
Immediately Allocate Existing Resources to Maximize Growth and Reduce Costs									
Bank	4	17.4	7	30.4	12	52.2	2.33	.35	4
MFG	3	10.3	16	55.2	10	34.5	2.27	.45	5
Revamp Personnel Policies									
Bank	11	47.8	8	34.8	4	17.4	1.68	.34	4
MFG	15	51.7	12	41.4	2	6.9	1.54	.41	5
Avoid Seductive Pitfalls									
Bank	3	13.6	15	68.2	4	18.2	2.05	.17	4
MFG	14	50.0	9	32.1	5	17.9	1.63	.21	5

Table VII-27
LGI Level:
Identification of Priorities in CGD

	F r e q u e n c y D i s t r i b u t i o n					
	Not a Priority(1)		Unclear(2)		A Clear Priority(3)	
	N	Percent	N	Percent	N	Percent
Prepare Plan for Future						
Level 1 ¹	1	10.0	3	30.0	6	60.0
Level 2	5	16.7	11	36.7	14	46.7
Level 3	4	22.2	8	44.4	6	33.3
Create Divisional Offensive						
Level 1	1	10.0	7	70.0	2	20.0
Level 2	8	26.7	12	40.0	10	33.3
Level 3	7	38.9	6	33.3	5	27.8
Immediately Allocate Existing Resources to Maximize Growth And Reduce Costs						
Level 1	0	00.0	7	70.0	3	30.0
Level 2	3	10.0	13	43.3	14	46.7
Level 3	4	23.5	5	29.4	8	47.1
Revamp Personnel Policies						
Level 1	8	80.0	2	20.0	0	00.0
Level 2	13	43.3	15	50.0	2	6.7
Level 3	7	38.9	5	27.8	6	33.3
Avoid Seductive Pitfalls						
Level 1	3	30.0	3	30.0	4	40.0
Level 2	9	31.0	16	55.2	4	13.8
Level 3	8	47.1	8	47.1	1	5.9

¹Level 1 - Vice-Presidents, Level 2 - Directors, Level 3 - Plant Managers. Based on ten runs.

Table VII-28
Identification of Priorities in IGD

	Frequency Distribution						
	Not a Priority(1)		Unclear(2)		A Clear Priority(3)		Standard Deviation
	<u>N</u>	<u>Percent</u>	<u>N</u>	<u>Percent</u>	<u>N</u>	<u>Percent</u>	
Decide on Financing New Capital Outlays	13	23.2	25	44.6	18	32.1	2.09
Emphasize Effectiveness Of PD	29	53.7	19	35.2	6	11.1	1.58
Plan to Improve Division's Ability to Hold and Motivate Staff	26	49.1	23	43.4	4	7.5	1.56
Push for Energy and Raw Materials Cost Cutting System	8	14.0	19	33.3	30	52.6	2.38
							.49
							10

Table VII-29
Banking vs. Manufacturing:
Identification of Priorities in IGD

		Frequency Distribution							
		Not a Priority(1)		Unclear(2)		A Clear Priority(3)			
		<u>N</u>	<u>Percent</u>	<u>N</u>	<u>Percent</u>	<u>N</u>	<u>Percent</u>	<u>Mean</u>	<u>Standard Deviation</u>
Decide on Financing New Capital Outlays	Bank	6	27.3	4	18.2	12	54.5	2.28	.35
	MFG	6	21.4	17	60.7	5	17.9	1.97	.07
Emphasize Effectiveness Of PD	Bank	12	54.5	7	31.8	3	13.6	1.57	.57
	MFG	15	57.7	9	34.6	2	7.7	1.54	.37
Plan to Improve Division's Ability to Hold and Motivate Staff	Bank	12	57.1	7	33.3	2	9.5	1.51	.36
	MFG	13	50.0	12	46.2	1	3.8	1.51	.25
Push for Energy and Raw Materials Cost Cutting Systems	Bank	3	12.5	7	29.2	14	58.3	2.46	.25
	MFG	5	18.5	12	44.4	10	37.0	2.19	.58

Table VII-30
LGI Level:
Identification of Priorities in IGD

	Frequency Distribution					
	Not a Priority(1)		Unclear(2)		A Clear Priority(3)	
	<u>N</u>	<u>Percent</u>	<u>N</u>	<u>Percent</u>	<u>N</u>	<u>Percent</u>
Decide on Financing New Capital Outlays						
Level 1 ¹	0	00.0	3	30.0	7	70.0
Level 2	5	17.2	15	51.7	9	31.0
Level 3	8	47.1	7	41.2	2	11.8
Emphasize Effectiveness of PD						
Level 1	5	50.0	3	30.0	2	20.0
Level 2	15	53.6	10	35.7	3	10.7
Level 3	9	56.3	6	37.5	1	6.3
Plan to Improve Division's Ability To Hold and Motivate Staff						
Level 1	2	20.0	7	70.0	1	10.0
Level 2	17	60.7	8	28.6	3	10.7
Level 3	7	46.7	8	53.3	0	00.0
Push for Energy and Raw Materials Cost Cutting Systems						
Level 1	2	20.0	3	30.0	5	50.0
Level 2	4	14.3	11	39.3	13	46.4
Level 3	2	10.5	5	26.3	12	63.2

¹Level 1 - Vice-Presidents, Level 2 - Directors, Level 3 - Plant Managers. Based on ten runs.

Table VII-31
Identification of Priorities
By the Management Committee

	Frequency Distribution						
	Not a Priority(1)		Unclear(2)		A Clear Priority(3)		Standard Deviation
	<u>N</u>	<u>Percent</u>	<u>N</u>	<u>Percent</u>	<u>N</u>	<u>Percent</u>	
Internal Reorganization	22	55.0	7	17.5	11	27.5	1.73
Create Corporate Offensive	19	50.0	9	23.7	10	26.3	1.78
Revamp Personnel Policies	22	56.4	7	17.9	10	25.6	1.69
Develop Public Policy Stance	16	41.0	10	25.6	13	33.3	1.94
							.57
							.49
							.56
							.66

Table VII-32
Banking vs. Manufacturing:
Identification of Priorities
By the Management Committee

	Frequency Distribution									
	Not a Priority(1)		Unclear(2)		A Clear Priority(3)		Mean	Standard Deviation	N	
	N	Percent	N	Percent	N	Percent				
Internal Reorganization										
Bank	8	50.0	2	12.5	6	37.5	1.88	.66	4	
MFG	13	65.0	5	25.0	2	10.0	1.45	.37	5	
Create Corporate Offensive										
Bank	5	33.3	3	20.0	7	46.7	2.15	.53	4	
MFG	11	57.9	6	31.6	2	10.5	1.53	.32	5	
Revamp Personnel Policies										
Bank	11	68.8	2	12.5	3	18.8	1.50	.41	4	
MFG	11	57.9	5	26.3	3	15.8	1.58	.33	5	
Develop Public Policy Stance										
Bank	7	43.8	4	25.0	5	31.3	1.88	.83	4	
MFG	8	42.1	5	26.3	6	31.6	1.93	.67	5	

VIII: DISCUSSION

It is customary to end research reports with cautions about the limits of the data and with calls for more research. We take these cautions and calls to be self-evident and view this report as the first step in the continuing analysis of data being generated by Looking Glass.

With a sample of 200 managers, the temptation was great to treat individuals rather than simulation runs as the unit of analysis. However, we decided that logically the organization or division had to be the predominate unit of analysis - in spite of all the problems inherent in aggregating individual data. Among other things, this means that standard deviations calculated by run were considerably smaller than they would have been for individuals.

We have not attempted to generalize to all managers, all banks, or all manufacturing organizations, and have not used significance tests which are typically employed for such generalizations. Our highlights are based on what stood out to us, not on probability levels. We found it frustrating not to have asterisks to guide us in identifying important points, but hope that both we and the reader learned more from the data because we were forced to look more closely at them.

LGI was intended for upper level and primarily line managers but, as Section II showed, we had many lower level and staff managers in the sample. We do not know how much difference this made in the results, but as additional runs accumulate any differences should emerge clearly. We also do not know if the organizations participating in the study were typical of banking and manufacturing concerns. We are not sure that there is such a thing as a "typical" organization; every manager we have worked with is sure that his or her organization is different from others like it. We have no evidence that any of the three participating organizations was bizarre relative to others of its type.

All of these factors - that this is only the first of a series of reports, the ways data were aggregated, the absence of statistical tests, and the nature of the sample - are critically important to users of these norms. We have provided some basic descriptive data on what these managers did in Looking Glass. We make no claims that these data are prescriptive, nor do we suggest that others do so. The norms can be used as

benchmarks against which to compare future runs, but such comparisons should always take into account the samples from which the benchmarks came. Any variation in standard LGI administration procedures, measuring instruments, or computational procedures may invalidate comparison.

Looking Glass as a Research Tool

Looking Glass was designed as a research tool, and one of the reasons we built it was to see what simulation might contribute to the study of organizational behavior. On the basis of the results reported here and the research that went into them, we think there are some real strengths in using Looking Glass for research:

1. Diversity of measures. Organizations are messy, complex, and chaotic; LGI is much the same. Nonetheless, we have been able to use a variety of measures and methods to collect data. These included a standard survey instrument (a shortened form of the Survey of Organizations), specially designed and anchored questionnaires (power and decision-making), unobtrusive measures (e.g., phone and mail records), direct observation (activity sampling), and analysis of financial performance. In spite of this diversity, the norm tables show that all of these approaches were workable, often yielded the anticipated results, and resulted in adequate variance. We believe that Looking Glass is a unique research vehicle in the scope of topics that can be studied and in the breadth of methods that can be used to study them.
2. Feasibility of simulation. The research reported here shows clearly that complex simulations can be used with large numbers of managers for research purposes. Certainly running a simulation like Looking Glass is difficult, but it can be done without using student populations. More importantly, we do not have to settle for simulations involving tinker toys or erector sets - content valid simulation tools can be designed and used to study important issues in complex organizations. Macro as well as micro views can be taken and "real" outcomes, such as return on investment, can be examined in conjunction with process-oriented results.

3. Interesting hypotheses. An explicit purpose in creating Looking Glass was to generate some new hypotheses for research on organizations. While the data in this report are only a first step, we can see already a number of issues begging for explanation. For example, in Section VII we saw that managers in high power positions consistently rated their performance lower than did their peers, while managers in low power positions consistently rated their performance higher than did their peers. Understanding why this is so might shed some important new light on how self and peer evaluations work in complex organizational settings.

A second example from Section VII involves perceptions of effectiveness as a business unit. We found that LGI managers in divisions where there was more participation rated effectiveness higher if they were at lower levels and lower if they were at higher levels. In the less participatory division the trend was the opposite. Research on participatory leadership indicates that involvement in decision-making tends to increase satisfaction, but it has not told us that the managers who allow more participation are less satisfied with the quality of the outcome. If these results replicate, we might at last have some deeper insight into why managers do not encourage participation as much as we think they should.

Additional examples abound, particularly pertaining to the differences between divisions facing stable and unstable environments. Suffice it to say that realistic simulation can be an extremely valuable source of hypotheses because 1) each run begins the same way, so differences in outcomes have to be the result of what the particular group did, 2) most of the forces that confound everyday management life also confound behavior in a complex simulation, therefore producing more variety and richness than researchers typically get to look at, and 3) many structural factors, such as divisional versus functional design, can be manipulated while the environmental factors remain constant.

4. Availability of norms. This report contains a staggering amount of data on what managers have done in LGI, how problems were handled, what climates were produced, and so on. Research on organizational and managerial effectiveness in field settings has always been limited by the lack

of comparability between jobs, organizations, or points in time. The availability of results from a standardized stimulus permits exact comparisons. Obviously simulation has inherent limits, but it broadens the possibility of lab and field studies complementing one another.

The norms presented here, particularly if supplemented by the data we have collected on each position, permit research on the individual, group, or organization level. It is possible to examine how each level relates to the others and which measures make the most sense for which types of analysis.

5. Aggregation questions. LGI can be an extremely valuable tool for learning more about the problems associated with data aggregation. The combination of multiple data collection methods and multiple levels of aggregation, combined with changes in instrumentation that can be made in future runs (remember, each run is a true replication), make researching the problem much more feasible. The results should help us understand the relationship between perception of the environment and objective measures of environmental characteristics.
6. Accumulation of data. While designed as a research tool, Looking Glass is a useful simulation for management training and development. This feature has resulted in the expanding use of LGI in management training programs and assured the availability of research sites and samples into the future. Next year we anticipate forty runs of LGI with managerial samples. The dual purposes that complex simulations can serve are what makes research with them feasible. In short, developing and running such simulations is time consuming initially - especially when the researchers find themselves doing everything from taping down phone wires to conducting post-simulation training. Once the initial phase is past, others can run the program. Our problem now is not how to get more runs, rather it is how to get our research act together in time to take advantage of the growing pool of research sites.

Eighteen times in the past two years we have watched twenty professional managers do in a simulation what they do for a living. We have watched them struggle with the problems of Looking Glass, trying hard to effectively manage the company and each other. Their failures and successes were incredibly real, but the data reported here are only clouded reflections of what happened. There is so much more to learn, especially about making our data collection methods more sensitive to the realities they attempt to capture. But after this first cut at the data from Looking Glass, we think we are on the right track. As Lewis Thomas said of a different area of research:

The new mass of knowledge is still formless, incomplete, lacking the essential threads of connection, displaying misleading signals at every turn, riddled with blind alleys. There are fascinating ideas all over the place, irresistible experiments beyond numbering, all sorts of new ways into the maze of problems . . . It is a puzzling time, but a very good time.

(Thomas, 1974, 139)

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APPENDIX

Frequency Distributions:
Information and Decisions
From the Decision-Making Questionnaires

Five Decision-Making Questionnaires (DMQs) were used with Looking Glass: One for each division, one for the Management Committee, and one for the President. The portions of the DMQs reproduced here consider key problems facing each division and the corporation as a whole. Using the entire sample, we have computed the number of people who knew each piece of information and the number of people saying each decision alternative was chosen.

There have been 70 participants in APD, 60 each in CGD and IGD, 40 members of Management Committees, and ten presidents. As an example of reading the tables, look at APD problem A, Marketing. Fifteen people said they knew that "Marketing has a small staff." This is 21.4% of the 70 people who have gone through APD.

ADVANCED PRODUCTS DIVISION

A. MARKETING

1. Did you know that . . .

15/21.4 marketing has a small staff (3 analysts)?

52/74.3 the capacitors market may be shrinking?

56/80.0 Product Development has developed a new integrated circuits chip?

22/31.4 one customer received free maintenance to keep a contract in force?

44/62.9 capacitor sales are diminishing?

31/44.3 Optical Fibers relies primarily on two customers?

6/ 8.6 customers are exposed up to 20 times to advertisements?

2. What was done with the marketing problem?

26/37.1 don't know

18/25.7 it was discussed, but no concrete action was taken

18/25.7 further discussions were scheduled

2/ 2.9 decided to expand market research

5/ 7.1 decided to push for budget increase to market new and existing products

9/12.9 decided to develop marketing campaign for new IC chip

5/ 7.1 recommended getting out of glass capacitors

8/11.4 decided to increase number and/or diversify customers

5/ 7.1 decided to emphasize traditional rather than high technology markets

1/ 1.4 decided to stop free maintenance

2/ 2.9 decided to change advertising strategy to stop overexposure of customers to advertisements

1/ 1.4 decided to reorganize Sales and Marketing into corporate-wide function

other: 5/ 7.1

B. SODA ASH

1. Did you know that . . .

66/94.3 there was a soda ash shortage?

43/61.4 CGD has a six-week supply?

43/61.4 two alternative suppliers exist--in Buffalo (\$36.35/ton)
and Flagstaff (\$36.50/ton)?

19/27.1 at the worst, costs over the next month will increase about
\$5,000 or \$220 per day?

3/ 4.3 American Materials can accept new customers, if orders do not
exceed 60 tons/day (\$35.50/ton)?

2. What was done about the soda ash shortage?

11/15.7 don't know

9/12.9 it was discussed, but no concrete action was taken

17/24.3 further discussions were scheduled

9/12.9 decided to buy from multiple sources to prevent future stoppages

10/14.3 decided to borrow from CGD

2/ 2.9 decided to purchase from American Materials

30/42.9 decided to purchase from alternative supplier(s) in Buffalo or
Flagstaff

4/ 5.7 decided to buy own soda ash source

other: 6/ 8.6

C. ENERGY

1. Did you know that . . .

37/52.9 oil and gas prices are skyrocketing?

29/41.4 electric melters are practically pollution free?

47/67.1 the new Optical Fibers plant failed to pass EPA inspection?

36/51.4 this failure was due to fluoride emissions (manufacturer failed to meet APD specifications)?

29/41.4 electric melters cost \$1.5 to \$2 million more than gas melters?

28/40.0 electricity is cheaper in the long run because of pollution control and carbon dioxide produced as a by-product?

39/55.7 gas is the primary fuel used by APD?

2. What was done about the energy problem?

21/30.0 don't know

15/21.4 it was discussed, but no concrete action was taken

7/10.0 further discussions were scheduled

7/10.0 decided to put pressure on manufacturer of melters for new Optical Fibers plant

18/25.7 decided to comply with EPA

0/ 0.0 decided to build energy storage facilities at plants

0/ 0.0 decided to buy own energy source

7/10.0 decided to develop a long-range energy plan to switch to all electric

3/ 4.3 decided energy should be corporate policy; APD should not act independently

other: 3/ 4.3

D. BOND TELEPHONE

1. Did you know that . . .

39/55.7 Bond Telephone has a new optical fibers project?

25/35.7 Bond Telephone has invited the Vice-President of APD to serve on its board?

20/28.6 sales to Bond are up 10 percent this quarter?

32/45.7 Bond accounts for 30 percent of optical fiber sales?

36/51.4 Bond wants a 10 percent price cut?

12/17.1 total profit from Bond sales this year is expected to be almost \$1 million?

2. What was done regarding Bond Telephone?

23/32.9 don't know

12/17.1 it was discussed, but no concrete action was taken

12/17.1 further discussions were scheduled

11/15.7 Vice-President joined board

4/ 5.7 Vice-President refused to join board

4/ 5.7 price cut granted

2/ 2.9 price cut rejected

5/ 7.1 decided to change marketing strategy to decrease reliance on one or two major customers

9/12.9 decided to make counterproposal to Bond

other: 3/ 4.3

E. CAPACITOR BLANKS

1. Did you know that . . .

39/55.7 the Flat Glass plant makes glass blanks for the Capacitors plant?

35/50.0 CGD's margin is 2%; APD saves 70% over the cost of buying outside?

26/37.1 APD has requested a 20% price increase for glass capacitors?

36/51.4 CGD wants a 7% margin to produce glass blanks for capacitors?

33/47.1 CGD would like to stop supplying them?

28/40.0 buying glass casings on the outside could cut capacitors market share by 30 percent?

37/52.9 some of APD thinks that CGD has overcosted the blanks?

2. What was done about glass capacitor blanks?

24/34.3 don't know

17/24.3 it was discussed in APD, but no concrete action was taken

14/20.0 it was discussed with CGD

12/17.1 further discussions were scheduled

6/ 8.6 CGD will continue to supply blanks as it has in the past

0/ 0.0 APD buys glass blanks outside

0/ 0.0 IGD makes blanks

1/1.4 CGD will provide the blanks at an increased margin, but less than 7%

1/1.4 CGD will provide the blanks, but at a 7% or more margin

2/2.9 formed corporate policy that all transfers are cost plus inflation

other: 7/10.0

F. INTEGRATED CIRCUITS

1. Did you know that . . .

60/85.7 there is an offer to purchase the IC plant for \$5 million?

53/75.7 the product line has lost \$4.2 million the past two years?

54/77.1 sales are increasing slightly?

35/50.0 production is running smoothly?

49/70.0 a new chip may produce a 40% profit margin?

17/24.3 profits next year could total \$2.8 million?

30/42.9 market share is dropping slightly?

22/31.4 the VI-20 and VI-21 chips are similar in appearance, creating shipping problems?

30/42.9 there is some question among customers if Looking Glass can produce quality integrated circuit products (VI-20 chip was lousy)?

14/20.0 the book value of the plant is \$5.5 million?

44/62.9 the plant is only three years old and turned a profit the first year of operation?

2. What was done about the integrated circuits product line?

9/12.9 don't know

6/ 8.6 it was discussed, but no concrete action was taken

14/20.0 further discussions were scheduled

18/25.7 decided to sell the plant

2/ 2.9 decided to ask Silicon for book value of plant or more

23/32.9 decided to market the new chip aggressively

13/18.6 deferred decision for a specified length of time (e.g., one year to put new chip into production)

other: 6/ 8.6

G. NEW CAPACITORS PLANT

1. Did you know that . . .

48/68.6 APD plans to build a new capacitors plant?

37/52.9 capacitor sales are down slightly?

35/50.0 several sites have been assessed?

18/25.7 market research thinks the glass capacitors market should be de-emphasized?

13/18.6 the cost is around \$11 million?

2. What was done about building the Capacitors plant?

26/37.1 don't know

10/14.3 it was discussed, but no concrete action was taken

9/12.9 further discussions were scheduled

17/24.3 selected Corpus Christi

2/ 2.9 selected Portland

2/ 2.9 cancelled plan because of slumping capacitor sales

other: 6/ 8.6

H. CONTROL SYSTEMS FOR PRODUCT ORDERS & RAW MATERIALS

1. Did you know that . . .

- 35/50.0 raw materials wastage in Capacitors has increased?
- 27/38.6 raw materials costs are up in Optical Fibers (theft)?
- 39/55.7 orders are coming in batches?
- 20/28.6 temporary employment is up in Optical Fibers (theft)?
- 42/60.0 orders are going to the wrong plant?
- 29/41.4 the new invoices are inadequate?
- 34/48.6 as a result of not receiving orders, Integrated Circuits has lost \$23,000 in business?
- 23/32.9 there was a foul-up with a NASA order?
- 30/42.9 independent dealers for capacitors are complaining about inadequate supply?
- 27/38.6 there was \$100,000 in lost sales in capacitors last quarter?

2. What was done about control systems?

- 12/17.1 don't know
- 16/22.9 it was discussed, but no concrete action was taken
- 17/24.3 further discussions were scheduled
- 17/10.0 thefts were investigated
- 10/14.3 decided to check out the new invoices to make sure the problem was corrected
- 9/12.9 a troubleshooter or Quality Control was assigned to spot and correct deviations
- 22/31.4 decided to institute a new ordering procedure
- 6/ 8.6 decided to change raw materials procurement system
- 9/12.9 new screens were obtained

other: 4/ 5.7

I. SALES MORALE

1. Did you know that . . .

29/41.4 there is poor follow-up with military contracts in optical fibers sales?

29/41.4 salespeople are quitting?

17/24.3 there was a drop in military sales in capacitors last quarter?

15/21.4 salespeople are making too many calls?

28/40.0 salespeople complain of excessive military paperwork?

37/52.9 there was no monetary incentive for salespeople to service contracts?

40/57.1 orders often come in batches?

13/18.6 one region has lost 4 of its 5 salespeople?

2. What was done about sales force morale?

25/35.7 don't know

11/15.7 it was discussed, but no concrete action was taken

17/24.3 further discussions were scheduled

2/ 2.9 decided to expand the sales force

13/18.6 decided to provide incentives for servicing contracts

9/12.9 decided to work with military to streamline paperwork requirements

other: 8/11.4

J. SHIPPING PROBLEMS

1. Did you know that . . .

27/38.6 trays of capacitors are being dropped in shipping?

19/27.1 there are shipping problems in Integrated Circuits (chips look similar)?

25/35.7 there are delivery problems in Integrated Circuits (complaint from Sylvester)?

31/44.3 some of the \$100,000 in lost sales in Capacitors last quarter are attributable to shipping problems?

2. What was done about the shipping problem?

25/35.7 don't know

10/14.3 it was discussed, but no concrete action was taken

9/12.9 further discussions were scheduled

3/ 4.3 decided to establish a control system

18/25.7 seen as a result of other problems (e.g., invoice problems, sales morale); taking care of them would eliminate the shipping problem

7/10.0 decided to color code products

other: 5/ 7.1

K. PRODUCT DEVELOPMENT

1. Did you know that . . .

18/25.7 PD has a small staff (20)?

11/15.7 staff performance is under question by the President and Director of Manufacturing?

22/31.4 PD is spending time worrying about screens for raw materials?

18/25.7 scientists are transferring from CGD and IGD to APD?

39/55.7 some basic research is being done with charge-coupled devices, bubble memory, and electron beam lithography?

22/31.4 CGD has developed a new float process?

4/ 5.7 IGD has developed a new finishing process?

2. What was done about Product Development?

41/58.6 don't know

8/11.4 it was discussed, but no concrete action was taken

5/ 7.1 further discussions were scheduled

2/ 2.9 decided to increase PD budget

0/ 0.0 decided to reorganize PD into corporate-wide function

7/10.0 decided to increase emphasis on new products

3/ 4.3 personnel policy was established to stop piecemeal transfer of scientists

5/ 7.1 decided to step up staff development efforts

0/ 0.0 decided to tap into CGD's float glass research

0/ 0.0 decided to tap into IGD's finishing process research

3/ 4.3 reassigned responsibility for screens elsewhere (e.g., Quality Control)

other: 2/ 2.9

L. PUBLIC POLICY

1. Did you know that . . .

50/71.4 EPA is pushing for better pollution control?

28/40.0 EE0C threatens a lawsuit in three months?

18/25.7 EE0C has increased its enforcement and compliance effort 50%?

17/24.3 Legal wants to go to court with EE0C?

16/22.9 PD has a plan to meet affirmative action goals?

2. What was done about public policy?

25/35.7 don't know

13/18.6 it was discussed, but no concrete action was taken

8/11.4 further discussions were scheduled

1/ 1.4 decided to tell Legal to quit sword-rattling and cooperate

6/ 8.6 decided to explain affirmative action efforts to EE0C

13/18.6 decided to specify goals for affirmative action

0/ 0.0 decided to go to court with EE0C

6/ 8.6 decided to create awareness on part of EPA concerning
APD's efforts in pollution control

other: 1/1.4

COMMERCIAL GLASS DIVISION
A. FLAT GLASS PLANT CAPACITY

1. Did you know that . . .

42/70.0 environmental glass markets are projected to continue growing at 8.2% annually?

32/53.3 current Flat Glass capacity could be increased by 50 million sq. ft. by converting to float?

19/31.7 conversion will cost a minimum of \$6.95 million?

25/41.7 capacity could be increased by 1/3 by expanding the Flat Glass plant (\$11.08 million minimum)?

19/31.7 one of CGD's scientists has discovered a new float process?

32/53.3 the cost of goods manufactured in Flat was up 4% last quarter?

27/45.0 production of environmental glass was 120% of normal last quarter, 126% this month?

27/45.0 the increased production has been achieved by reducing maintenance and increasing overtime for the third shift?

33/55.0 trade glass markets are projected to decline by 5% next year?

2. How was the capacity problem handled?

5/ 8.3 don't know

17/28.3 it was discussed, but no concrete action was taken

30/50.0 further discussions were scheduled

16/26.7 decided to convert to float

15/25.0 decided to expand the plant

2/ 3.3 decided to cut back on sales

2/ 3.3 decided to build a new plant

7/11.7 decided to use other Looking Glass or competitors' plants, at least temporarily, to increase capacity

other: 2/ 3.3

B. LIGHTING PRODUCTS

1. Did you know that . . .

46/76.7 the Lighting Products plant has the oldest machinery in the company?

60/100 the plant has a problem with EPA over emissions?

43/71.7 the newspaper has reported that these emissions are killing trees?

46/76.7 glass excess on bulbs and envelopes is causing customer complaints?

14/23.3 maintenance costs rose 3% last month?

41/68.3 although costs are increasing, prices must stay low to remain competitive?

42/70.0 there are some problems with packaging?

35/58.3 the life expectancy of a melting furnace is 7.6 years?

30/50.0 one melting furnace in Lighting Products is 7 years old?

21/35.0 laser cutting might be a solution to the glass excess problem?

2. What was done about the "aging" problems in Lighting Products?

16/26.7 don't know

14/23.3 it was discussed, but no concrete action was taken

26/43.3 further discussions were scheduled

1/ 1.7 decided to close the plant for refurbishing

12/20.0 a plan was developed for phased equipment modernization

13/21.7 decided to do whatever was needed to comply with EPA

0/ 0.0 a new packaging system was decided on

0/ 0.0 decided to sell the Lighting Products plant

2/ 3.3 concrete steps were taken to investigate laser cutting

other: 5/ 8.3

C. INTERNAL TRANSFER OF GLASS BLANKS

1. Did you know that . . .

50/83.3 the Flat Glass plant makes glass blanks for the Advanced Products Division?

42/70.0 CGD's margin is 2% on these blanks, while APD saves 10% over the cost of buying outside?

38/63.3 CGD could make a 15% margin by devoting that capacity to environmental glass?

33/55.0 at a minimum, CGD would like the margin on blanks revised upwards to 7%?

37/61.7 making these blanks interrupts production of flat glass for outside customers?

10/16.7 APD will lose 30% of its market share if forced to buy outside?

11/18.3 APD believes CGD has made its margin on blanks artificially low by full-costing overhead?

2. How was the problem handled?

9/15.0 don't know

16/26.7 it was discussed in CGD, but no concrete action was taken

19/31.7 it was discussed with APD

14/23.3 further discussions were scheduled

7/11.7 CGD will continue to provide the blanks as it has in the past

2/ 3.3 CGD will provide the blanks at an increased margin but not as high as 7%

7/11.7 CGD will provide the blanks, but at a 7% or more margin

3/ 5.0 IGD will provide some or all of the blanks from now on

9/15.0 APD will buy blanks outside

other: 5/ 8.3

D. SYLVESTER ELECTRIC AND VERTICAL INTEGRATION

1. Did you know that . . .

33/55.0 Sylvester Electric has made inquiries into producing their own flourescent tubes and incandescent envelopes?

33/55.0 the technology is simple; prices must be kept low to compete?

26/43.3 Sylvester's new machines won't join slightly rough bulbs to sockets; CGD is having a slight glass excess problem?

24/40.0 Sylvester is having trouble with integrated circuits from APD; they think Looking Glass is declining in quality?

34/56.7 Sylvester accounts for 35% of all lighting product sales?

15/25.0 90% of the excess problem is solved; the last 10% will be very difficult?

4/ 6.7 APD feels that Sylvester's complaints about integrated circuit quality are a ploy to gain concessions on a new contract?

2. What was done about the Sylvester account?

25/41.7 don't know

12/20.0 it was discussed, but no concrete action was taken

11/18.3 further discussions were scheduled

2/ 3.3 decided to ignore the problem

5/ 8.3 a well-defined program was designed to improve bulb & tube quality

1/ 1.7 prices for Sylvester were reduced

2/ 3.3 a CGD representative was assigned to the Sylvester plant to work with their engineers

8/13.3 sales people will pay more attention to Sylvester

other: 5/ 8.3

E. STATUS OF PRODUCT DEVELOPMENT

1. Did you know that . . .

34/56.7 most of CGD's product development effort has gone into existing equipment and products (rather than new product development)?

19/31.7 the Product Development budget has been decreasing over the last 5 years?

27/45.0 several promising scientists have transferred from CGD to APD?

11/18.3 PD's file room is woefully inadequate?

12/20.0 many current PD staff lack up-to-date technical skills?

21/35.0 5 of 6 current product development projects involve machinery or packaging?

28/46.7 the plant managers want to take over machinery and packaging development?

25/41.7 Product Development has come up with a new float process?

22/36.7 As many as 14 different products have been identified by Product Development staff as feasible for production in CGD?

4/ 6.7 A Japanese firm with a plant in California has developed an improved float process?

2. Was anything done to improve the status of Product Development?

25/41.7 don't know

11/18.3 it was discussed, but no concrete action was taken

13/21.7 further discussions were scheduled

1/ 1.7 decided to leave PD as is

6/10.0 decided to increase the PD budget

4/ 6.7 decided to join forces with IGD to develop the new float process

5/ 8.3 decided to develop the new float process in CGD

1/ 1.7 decided to reorganize PD

6/10.0 a policy was established to stop the loss of personnel

12/20.0 decided to increase the emphasis on new products

3/ 5.0 decided to change the name of Product Development to Research and Development

other: 4/ 6.7

F. SODA ASH PROBLEMS

1. Did you know that . . .

53/88.3 Cyborg, the soda ash supplier for Lighting Products, is likely to go on strike?

29/48.3 American Materials, soda ash supplier for Flat Glass, is moving to Wyoming?

48/80.0 the Lighting Products plant can maintain production for six weeks into a strike?

23/38.3 American Materials' price will increase from \$33.25/ton to \$35.50/ton?

48/80.0 other divisions of Looking Glass have a soda ash shortage?

13/21.7 American Materials can accept a new customer if orders do not exceed 60 tons/day?

24/40.0 alternate soda ash suppliers are in Buffalo (\$36.35/ton) and Flagstaff (\$36.50/ton)?

2. What was done about soda ash?

11/18.3 don't know

14/23.3 it was discussed, but no concrete action was taken

11/18.3 further discussions were scheduled

6/10.0 CGD agreed to supply another part of Looking Glass with some soda ash

19/31.7 Lighting Products located a new source of supply

3/ 5.0 decided to let things stand

2/ 3.3 decided to reduce production at Lighting Products during the strike

8/13.3 decided to go to multi-sourcing to prevent future shortages

0/ 0.0 decided to buy a soda ash company of our own

other: 6/10.0

G. PRICE INCREASE FOR LIGHTING PRODUCTS

1. Did you know that . . .

24/40.0 the LP plant would like to raise prices by 10% to offset increasing costs?

25/41.7 a market analyst recommends no increase beyond 4% since it would threaten the market position?

19/31.7 a consultant suggests low prices and high quality are necessary to keep customers from making their own bulbs and envelopes?

17/28.3 the Government has urged all of the industry to institute voluntary price controls?

2. What was done about prices in Lighting Products?

24/40.0 don't know

15/25.0 it was discussed, but no concrete action was taken

18/30.0 further discussions were scheduled

4/ 6.7 prices were kept the same

2/ 3.3 prices were raised, but 4% or less

3/ 5.0 prices were raised between 4.1% and 9.9%

1/ 1.7 decided to raise prices by 10% or more

0/ 0.0 sales and marketing people from all divisions met to formulate a consistent pricing policy

other: 2/ 3.3

H. POTENTIAL NEW PRODUCTS FOR CGD

1. Did you know that the following products were brought up as possibilities for CGD?

33/55.0 mercury and sodium lamps for Major Electric

26/43.3 heat resistant bulbs for ovens for Eastern Lights

30/50.0 auto headlamps for European markets

28/46.7 lantern globes for Rasmussen Lamps

28/46.7 vehicular glass for marine and recreational vehicle markets

24/40.0 solar collection panels for satellites, homes, and industry

12/20.0 periscope lenses for the Navy

23/38.3 furnace linings for New England Furnace

4/ 6.7 laboratory slides for Glasspack

21/35.0 Product Development had at least 8 other practical ideas for new products

2. What was decided about producing new products in CGD?

15/25.0 don't know

12/20.0 it was discussed, but no concrete action was taken

16/26.7 further discussions were scheduled

5/ 8.3 decided not to produce any new products at this time

8/13.3 decided to produce mercury and sodium lamps

0/ 0.0 decided to produce heat resistant bulbs

1/ 1.7 decided to produce auto headlamps

4/ 6.7 decided to produce lantern globes

0/ 0.0 decided to produce vehicular glass

3/ 5.0 decided to produce solar collection panels

1/ 1.7 decided to produce periscope lenses

3/ 5.0 decided to produce furnace linings

0/ 0.0 decided to produce laboratory slides

other: 1/ 1.7

I. NATIONAL LAWSUIT

1. Did you know that . . .

39/65.0 CGD is involved in a potential lawsuit with National Building?

37/61.7 National accounts for 21% of flat glass sales?

25/41.7 sales to National were up 22.5% last quarter?

32/53.3 National will accept a 50% settlement out of court?

19/31.7 National is adamant in its position - 50% or go to court?

2. What was done about the suit?

21/35.0 don't know

5/ 8.3 it was discussed, but no concrete action was taken

9/15.0 further discussions were scheduled

3/ 5.0 decided to take National to court

19/31.7 decided to settle with National for 50% of the damages

4/ 6.7 decided to meet with National to negotiate a different
arrangement

other: 1/ 1.7

J. DIVERSION OF FLAT GLASS ORDERS

1. Did you know that . . .

38/63.3 35% of National's flat glass orders are 4 days to 3 weeks late?

29/48.3 shipments intended for National are being diverted to bigger customers?

26/43.3 sales is diverting orders to Apex?

34/56.7 25% of environmental glass shipments are, on average, 3 days or more late?

20/33.3 the Plant Manager, Flat Glass, had a memo from a District II salesperson on the Apex account requesting diversion of orders to Apex from National & Construction Trades?

21/35.0 Apex accounts for 29% of flat glass sales, National & Construction Trades 21% and 22% respectively.

16/26.7 diversion confusion has lowered morale in the shipping department?

21/35.0 an anonymous letter reports a rumor of an affair between a District II salesperson and the Apex purchasing manager?

2. What was done about diverting flat glass orders?

23/38.3 don't know

5/ 8.3 it was discussed, but no concrete action was taken

8/13.3 further discussions were scheduled

16/26.7 a policy was established to insure equitable distribution of goods (e.g., first-come, first-served)

2/ 3.3 decided to continue the practice of serving the largest customer first

1/ 1.7 a PR effort was launched to pacify National and/or Construction Trades

0/ 0.0 decided that no action was necessary since capacity at the Flat Glass plant would be increased

other: 4/ 6.7

K. LOSS OF PERSONNEL

1. Did you know that . . .

21/35.0 three promising scientists have transferred from CGD to APD in the last three years?

23/38.3 a Senior Research Specialist in Product Development, CGD, has requested a transfer to APD?

28/46.7 a top salesperson has requested a transfer to APD (two others have transferred in the last 2 years)?

15/25.0 IGD is also losing personnel to APD?

19/31.7 APD is aware of the problem and wants to work something out?

2. What was done about personnel transfer?

20/33.3 don't know

9/15.0 it was discussed, but no concrete action was taken

13/21.7 further discussions were scheduled

0/ 0.0 decided to create a job rotation policy to stop transfer requests

8/13.3 decided to revise incentives in CGD to retain talent

0/ 0.0 decided to do nothing

18/30.0 decided to focus on changing the image of CGD, in hopes that would eliminate the problem

other: 8/13.3

L. ENERGY

1. Did you know that . . .

22/36.7 conversion to float can result in a 19.9% reduction in energy use in 2 years?

51/85.0 energy interruption is a threat and energy costs are rising?

38/63.3 energy use can be cut only 30% before a plant must shut down?

30/50.0 electric furnaces are 3 times as efficient as gas melters?

39/65.0 energy problems will get worse over the next 20 years?

27/45.0 energy is a substantial percentage of the cost of goods manufactured?

6/10.0 APD had a lot of information on energy alternatives, including comparative cost, efficiency, and pollution requirements for coal, gas, electricity, and oil?

2. What was done about energy?

26/43.3 don't know

14/23.3 it was discussed, but no concrete action was taken

15/25.0 further discussions were scheduled

6/10.0 decided to use electric melters in the future

0/ 0.0 decided to buy our own energy source (e.g., oil wells or coal deposits)

0/ 0.0 decided to build energy storage facilities at the plants

1/ 1.7 decided to systematically increase the ability of plants to convert from one energy source to another (e.g., from electric to gas) as necessary

2/ 3.3 decided that energy use should be a corporate policy and CGD would not act independently

other: 1/ 1.7

M. UNIONIZATION

1. Did you know that . . .

34/56.7 Flat Glass is a nonunion plant?

14/23.3 there was an age discrimination grievance in Flat?

22/36.7 morale in shipping is quite low?

6/10.0 benefits are substantially lower in Flat than in Lighting?

27/45.0 Flat's average wage is lower than union average?

32/53.3 the latest union vote was 42% in favor (versus 21% last time)?

31/51.7 conversion to float could reduce the labor force?

2. What was done about the union vote?

30/50.0 don't know

13/21.7 it was discussed, but no concrete action was taken

8/13.3 further discussions were scheduled

1/ 1.7 decided to ignore the whole issue for a while

2/ 3.3 decided to raise wages and/or fringes in Flat

0/ 0.0 decided to encourage the union to come in

4/ 6.7 decided to train Flat managers in human relations skills

5/ 8.3 a program was started to improve working conditions in the plant

4/ 6.7 a plan was developed so conversion to float would not cost any jobs

other: 2/ 3.3

INDUSTRIAL GLASS DIVISION

A. ENERGY

1. Did you know that . . .

39/65.0 natural gas costs for the Specialty Glass plant were up 50% over the previous year?

24/40.0 successful energy cost reduction methods used at Corning could be implemented in IGD?

28/46.7 natural gas prices for Specialty Glass increased 38% last year?

25/41.7 another 10% increase in natural gas prices has been announced?

25/41.7 electricity is cheaper in the long run because of more efficient pollution control and carbon dioxide yielded as a by-product?

16/26.7 the start-up costs of converting to electricity are almost double those of converting to oil or coal?

18/30.0 the feasibility of using oil as an alternate energy source in the year 2000 is near zero?

2. What was done about the energy problem?

3/ 5.0 don't know

29/48.3 it was discussed, but no concrete action was taken

35/58.3 further discussions were scheduled

4/ 6.7 decided to implement a long-range plan to convert to electric melting at all plants

1/ 1.7 decided to convert only at Specialty Glass

3/ 5.0 decided to look for new natural gas suppliers and terminate the contract with Textro Industries

0/ 0.0 decided to buy own energy source (e.g., oil wells or coal deposits)

5/ 8.3 decided to develop a corporate policy since the energy problem is not limited to IGD

0/ 0.0 decided to build energy storage facilities at the plants

other: 6/10.0

B. RAW MATERIALS

1. Did you know that . . .

14/23.3 raw materials prices have gone up 15% over the last two years?

28/46.7 the use of cheaper raw materials at Auto Glass has required the use of a coarser sorting screen?

29/48.3 the screen, in allowing coarser materials to come through, may be causing quality problems?

25/41.7 APD supplies IGD with a substantial portion of its glass blanks for oven and spacecraft windows?

27/45.0 APD is trying to cut off IGD's supply, which would force IGD to either buy outside or raise prices of the finished product?

20/33.3 Glass Piping is the only plant whose raw materials costs are above budge (+7%)?

2. What was done about the raw materials problem?

17/28.3 don't know

11/18.3 it was discussed, but no concrete action was taken

15/25.0 further discussions were scheduled

5/ 8.3 decided to push corporate into changing APD's position on the transfer of glass blanks

9/15.0 decided to offer APD enough money to cover their G and A

3/ 5.0 decided to resume use of the finer sorting screen and buy higher quality raw materials at Auto Glass

10/16.7 decided to continue use of the coarser screen and deal with quality problems in the finishing room

0/ 0.0 decided that IGD should manufacture its own glass blanks for spacecraft and oven windows

1/ 1.7 decided to cut costs at Glass Piping by purchasing cheaper raw materials

other: 4/ 6.7

C. PRODUCTION CAPACITY PROBLEMS/AUTO GLASS

1. Did you know that . . .

52/86.7 the plant may not be able to handle the increased production capacity demands needed to secure new contracts with foreign car manufacturers?

34/56.7 an entirely new production line would be required to increase production by 25% (\$18 million)?

15/25.0 the plant is unable to buy a neighboring piece of real estate for expansion purposes?

29/48.3 the new production line would take at least two years to build?

29/48.5 there is a plan to replace most of the machinery over the next 10 years?

48/80.0 an annual growth rate of 6% is predicted for domestic car production?

32/53.3 IGD is considering entering the truck window market?

2. What was done about the Auto Glass capacity problem?

13/21.7 don't know

19/31.7 it was discussed, but no concrete action was taken

25/41.7 further discussions were scheduled

4/ 6.7 decided to build a new production line

6/10.0 decided to replace all the machinery within the next 10 years

9/15.0 decided to build a new Auto Glass plant on the West Coast

7/11.7 decided to secure either the Japanese or German foreign car contracts

2/ 3.3 decided to temporarily increase production time by running additional shifts until a more permanent solution can be obtained

other: 7/11.7

D. PRODUCT DEVELOPMENT

1. Did you know that . . .

10/16.7 the skills of the PD staff are held in question?

9/15.0 PD has traditionally hired leftover line managers instead of professionals?

25/41.7 IGD staff are transferring to APD?

16/26.7 Glass Piping is unhappy with the way a PD task force handled the furnace lining expansion problem?

35/58.3 IGD needs a new packaging concept for glass piping products (10% suffer breakage during delivery)?

17/28.3 a PD staff member has created a breakthrough in liquid emission wastes?

25/41.7 PD is developing the technology for a new frost-free auto window?

8/13.3 the Director of Product Development feels the Vice-President has no appreciation of the role of PD?

2. What was done about the status of Product Development?

33/55.0 don't know

9/15.0 it was discussed, but no concrete action was taken

8/13.3 further discussions were scheduled

2/ 3.3 decided to begin hiring professionals

8/13.3 decided to undertake staff development efforts

4/ 6.7 decided to establish a policy to stop the transfer of personnel

1/ 1.7 decided to increase the PD budget

2/ 3.3 decided to stress development of new products

4/ 6.7 decided to reorganize PD into a corporate-wide function

0/ 0.0 decided to reorganize PD into two separate departments: Machinery Development and New Products

other: 2/ 3.3

E. PERSONNEL POLICIES

1. Did you know that . . .

31/51.7 IGD hourly pay rates are below the national glass industry average?

34/56.7 the prounion vote at Auto Glass increased from 15% to 39% during the last two years?

20/33.3 the efficiencies introduced by the new float process have forced a number of layoffs?

29/48.3 corporate is conducting workshops on ways of dealing with problem employees?

36/60.0 the Specialty Glass Plant Manager has requested a transfer to APD?

20/33.3 IGD sales staff are furious over corporate belt-tightening of sales staff expenditures?

2. What was done about personnel policies?

24/40.0 don't know

7/11.7 it was discussed, but no concrete action was taken

15/25.0 further discussions were scheduled

9/15.0 decided to revise wage structure to regain competitive standing

1/ 1.7 decided to develop incentives for hourly workers (e.g., bonuses)

1/ 1.7 decided to provide incentives for innovations (e.g., a new packaging concept)

1/ 1.7 decided to implement President's job rotation policy

14/23.3 decided to agree to Specialty Glass Plant Manager's transfer request, but not necessarily to APD

2/ 3.3 decided to establish a new policy for dealing with problem employees

other: 7/11.7

F. SALES PRACTICES

1. Did you know that . . .

36/60.0 sales have increased 14% over the previous year?

38/63.3 Specialty Glass sales are 15% below forecast?

38/63.3 small batch sales at Specialty and Glass Piping have created higher production costs (machinery downtime increased)?

25/41.7 a salesperson has been accused of unethical sales practices (e.g., use of corporate jet for unspecified business)?

23/38.3 the above salesperson has been doing a superb job?

23/38.3 small batch sales orders may be directly responsible for obtaining larger contracts?

24/40.0 IGD sales staff are irate over corporate belt-tightening of sales staff expenditures?

27/45.0 about 80% of Glass Piping sales are accounted for by 20% of the clients?

15/25.0 Bentley Aerospace insists on unlimited free maintenance as part of a contract bid (APD provided them with this service on integrated circuits)?

2. What was done about sales practices?

22/36.7 don't know

12/20.0 it was discussed, but no concrete action was taken

12/20.0 further discussions were scheduled

6/10.0 decided to push for a greater market share of specialty glass products, particularly the aircraft and spacecraft window lines

4/ 6.7 decided to establish specific minimums for the volume of sales orders

6/10.0 decided to continue the small batch sales policy

10/16.7 decided to create a "customer relations code of ethics" to eliminate such problems as sales staff use of corporate jet for "unspecified business"

3/ 5.0 decided to stop unlimited free maintenance on the Bentley contract

1/ 1.7 decided to push for corporate policy to eliminate preferential treatment of customers

2/ 3.3 decided to diversify customers

9/15.0 decided to discuss belt-tightening plans with corporate in an attempt to revise the policy

other: 5/ 8.3

G. MARKETING

1. Did you know that . . .

11/18.3 separate functions have been outlined for the sales and marketing staff?

15/25.0 IGD suffers from a lack of long-range marketing research studies?

20/33.3 wineries have increased by 41% since 1970?

17/28.3 IGD's sales and marketing needs have been slighted by corporate in favor of APD?

26/43.3 High Point Industries is planning a new generation of microwave ovens?

47/78.3 foreign car manufacturers have become increasingly interested in IGD as their sole window supplier?

39/65.0 new opportunities exist for entering the truck window market?

2. What was done about the marketing problem?

20/33.3 don't know

14/23.3 it was discussed, but no concrete action was taken

10/16.7 further discussions were scheduled

16/26.7 decided to push for more marketing research studies

8/13.3 decided to emphasize IGD's sales and marketing needs with Corporate

12/20.0 decided to push for sales in the winery market

12/20.0 decided to enter the truck window market

0/ 0.0 decided not to enter the truck window market

17/28.3 decided to secure foreign car contracts

0/ 0.0 decided to forget the foreign car contracts

2/ 3.3 decided to reorganize Sales and Marketing into a corporate-wide function

other: 0/ 0.0

H. PROJECT DEEPSEA

1. Did you know that . . .

17/28.3 IGD has spent \$3.5 million on the project?

23/38.3 it is the President's "pet project"?

18/30.0 submarine glass and sea lab glass require different specifications?

20/33.3 many rare, high-cost raw materials are required?

19/31.7 the potential market for underwater glass products is uncertain?

24/40.0 PD is fed up with the project?

2. What was done about Project Deepsea?

34/56.7 don't know

2/ 3.3 it was discussed, but no concrete action was taken

9/15.0 further discussions were scheduled

8/13.3 decided to scratch the entire project

0/ 0.0 decided to continue project with a focus on discovering usable low-cost raw materials

1/ 1.7 decided to focus on one type of glass (e.g., either sea lab or submarine windows)

3/ 5.0 decided to get the Navy to fund all additional research and continue with the project

other: 3/ 5.0

I. HIRING POLICIES

1. Did you know that . . .

46/76.7 women and minorities comprise only 1.5% of the management and professional staff at Auto Glass?

23/38.3 this constitutes a failure to meet Affirmative Action guidelines?

21/35.0 only 8% of the residents in the Auto Glass plant area are blacks and Chicanos?

12/20.0 minority group applicants are not seeking jobs at Auto Glass?

18/30.0 summer job slots are usually given to employees' relatives?

21/35.0 summer jobs could be given to qualified college graduates who might later seek permanent managerial and professional positions?

18/30.0 employees at Auto Glass resent having a female supervisor?

2. What was done about hiring policies?

25/41.7 don't know

7/11.7 it was discussed, but no concrete action was taken

14/23.3 further discussions were scheduled

10/16.7 decided to specify Affirmative Action goals as part of a hiring and promotion plan

10/16.7 decided to actively recruit minority group applicants at Auto Glass until guidelines are met

4/ 6.7 decided to explain unavailability of minority group applicants in Findlay area (Auto Glass plant) to government officials

4/ 6.7 decided to eliminate hiring employees' relatives during the summer

15/25.0 decided to recruit qualified college graduates for summer job positions

0/ 0.0 decided to stop hiring women for supervisory positions and focus on hiring females at higher level positions

other: 5/ 8.3

J. CAPACITY PROBLEMS - SPECIALTY GLASS & GLASS PIPING

1. Did you know that . . .

15/25.0 Specialty Glass makes a substantial amount of the borosilicate glass used at the Glass Piping Plant?

31/51.7 the variable overhead (reflecting utility costs) at Specialty Glass is +21%?

45/75.0 the Specialty Glass plant has shown a marked drop in income over the last quarter?

22/36.7 both plants are underutilizing their capacity?

24/40.0 Glass Piping's high raw materials cost is partly due to their purchase of small quantities?

23/38.3 an increasing percentage of West Coast consumers are buying products from both plants?

17/28.3 Glass Piping needs to increase the versatility of its machinery to meet varied glass specifications?

24/40.0 the combination of both plants at a West Coast site would reduce delivery costs and improve customer relations?

2. What was done about the capacity problem?

12/20.0 don't know

21/35.0 it was discussed, but no concrete action was taken

16/26.7 further discussions were scheduled

4/ 6.7 decided to sell current plant sites and create a combined plant on the West Coast

1/ 1.7 decided to decrease the production capacity of both plants

0/ 0.0 decided to sell the current machinery at Glass Piping and buy new, more flexible machinery

7/11.7 decided to focus production on microwave oven windows and de-emphasize the spacecraft window line at Specialty Glass

4/ 6.7 decided to push for a greater market share for Glass Piping products

6/10.0 decided to consolidate at one of the present sites

other: 8/13.3

L. SODA ASH - AUTO GLASS

1. Did you know that . . .

53/88.3 Auto Glass is facing a soda ash supply crisis?

40/66.7 the storage silos at Auto Glass hold only a three-day supply (total inventory: 6 days)?

28/46.7 CGD has a six-week supply?

32/53.3 it will be a month before the current supplier can resume their mining operation?

20/33.3 alternative suppliers exist in Buffalo (\$36.35/ton) and Flagstaff (\$35.50/ton)?

2. What was done about the soda ash crisis at Auto Glass?

20/33.3 don't know

3/ 5.0 it was discussed, but no concrete action was taken

11/18.3 further discussions were scheduled

2/ 3.3 decided to purchase a soda ash supply source

7/11.7 decided to borrow soda ash from CGD

6/10.0 decided to borrow from either Specialty Glass or Glass Piping

4/ 6.7 decided to purchase from multiple soda ash suppliers in order to avoid future stoppages

1/ 1.7 decided to increase storage capacity as a safeguard against possible future crisis

20/33.3 decided to buy from an alternative supplier

other: 4/ 6.7

MANAGEMENT COMMITTEE
A. NEW ENGLAND FURNACE

1. Did you know that . . .

32/80.0 200 tons of cellular glass need to be produced for
New England Furnace?

27/67.5 a dollar loss is expected?

18/45.0 although any of the plants could technically produce it,
Glass Piping (IGD) makes cellular glass?

15/37.5 Specialty Glass (IGD) makes borosilicate glass, the basic
component of cellular glass?

2. What was done about the New England Furnace order?

5/12.5 don't know

3/ 7.5 it was discussed, but no concrete action was taken

8/20.0 further discussions were scheduled

2/ 5.0 decided not to produce furnace linings at all

10/25.0 Glass Piping produces

4/10.0 Specialty Glass produces

5/12.5 another plant produces

0/ 0.0 subcontracted outside of Looking Glass

other: 5/12.5

B. CASCADE BOTTLING

1. Did you know that . . .

38/95.0 discussions are under way with Cascade to purchase their operations for \$42 million?

6/15.0 financing the purchase through debt would raise the debt/equity ratio to 86.0 and lower the bond rating to A?

8/20.0 Cascade made \$7.2 million last year?

2/ 5.0 5 to 6 years would be required to return Looking's investment?

2. What was done about Cascade Bottling?

3/ 7.5 don't know

6/15.0 it was discussed, but no concrete action was taken

10/25.0 further discussions were scheduled

6/15.0 decided to purchase Cascade

18/45.0 decided not to purchase Cascade

1/ 2.5 prepared counteroffer

other: 3/7.5

C. ENERGY

1. Did you know that . . .

9/22.5 natural gas costs for Specialty Glass increased 50% last year?

11/27.5 electric melting is the most effective means of pollution control?

15/37.5 gas is the primary fuel used by Looking Glass?

7/17.5 electric melting has up to twice the start-up costs of oil and gas processing?

5/12.5 conversion to float can result in a 19.9% reduction in energy use in two years?

4/10.0 electric furnaces are up to three times as efficient as gas melters?

14/35.0 CGD has developed a new float process?

4/10.0 electric melting produces pure carbon dioxide that is worth \$7.50 per ton of glass produced?

13/32.5 the new Optical Fibers plant failed to pass EPA inspection? (Gas melters failed to meet pollution standards.)

2. What was done about the energy problem?

25/62.5 don't know

9/22.5 it was discussed, but no concrete action was taken

6/15.0 further discussions were scheduled

1/ 2.5 decided to buy own energy source

0/ 0.0 decided to build storage facilities at plants

0/ 0.0 decided to develop a long-range energy plan to switch to all electric

1/ 2.5 energy should be corporate policy, divisions should not act independently

0/ 0.0 decided to convert to all float

other: 0/ 0.0

D. STATUS OF PRODUCT DEVELOPMENT

1. Did you know that . . .

- 4/10.0 Looking Glass has only a few professionals per division working on the development of new products?
- 6/15.0 staff performance is under question in APD and IGD?
- 3/ 7.5 in two divisions, PD is involved with trivial matters like screens for raw materials?
- 13/32.5 scientists wish to transfer from CGD and IGD to APD?
- 23/57.5 APD has developed a new integrated circuits chip?
- 9/22.5 CGD has dozens of new products, such as solar panels, that could be produced?
- 7/17.5 IGD has made a breakthrough in liquid emission controls?
- 11/27.5 much PD effort has gone into existing equipment and products rather than new product development?

2. What was done about product development?

- 18/45.0 don't know
- 7/17.5 it was discussed, but no concrete action was taken
- 6/15.0 further discussions were scheduled
- 1/ 2.5 decided to develop personnel policy to stop piecemeal transfer of scientists
- 1/ 2.5 decided to reorganize PD into corporate-wide function
- 3/ 7.5 decided to undertake developmental efforts to upgrade professional skills of staff
- 1/ 2.5 decided to increase PD budgets
- 2/ 5.0 decided to increase emphasis on new products
- 0/ 0.0 decided to reassign responsibility for existing equipment and products elsewhere (e.g., Quality Control)

other: 0/ 0.0

PRESIDENT

A. INTEGRATED CIRCUITS (APD)

1. Did you know that . . .

- 9 there is an offer to purchase the IC plant for \$5 million?
- 9 the product line has lost \$4.2 million the past two years?
- 10 sales are increasing slightly?
- 5 production is running smoothly?
- 6 a new chip may produce a 40% profit margin?
- 4 profits next year could total \$2.8 million?
- 5 market share is dropping slightly?
- 1 the VI-20 and VI-21 chips are similar in appearance, creating shipping problems?
- 1 there is some question among customers if Looking Glass can produce quality integrated circuit products (VI-20 chip was lousy)?
- 2 the book value of the plant is \$5.5 million?
- 6 the plant is only three years old and turned a profit the first year of operation?

2. What was done about the integrated circuits product line?

- 0 don't know
- 1 it was discussed, but no concrete action was taken
- 5 further discussions were scheduled
- 3 decided to sell the plant
- 0 decided to ask Silicon for book value of plant or more
- 3 decided to market the new chip aggressively
- 2 deferred decision for a specified length of time (e.g., one year to put new chip into production)

other: 2

B. NEW CAPACITORS PLANT (APD)

1. Did you know that . . .

9 APD plans to build a new capacitors plant?

7 capacitor sales are down slightly?

10 several sites have been assessed?

3 market research thinks the glass capacitors market should be de-emphasized?

5 the cost is around \$11 million?

2. What was done about building the Capacitors plant?

0 don't know

3 it was discussed, but no concrete action was taken

6 further discussions were scheduled

3 selected Corpus Christi

0 selected Portland

1 cancelled plan because of slumping capacitor sales

other: 3

C. FLAT GLASS PLANT CAPACITY (CGD)

1. Did you know that . . .

- 2 environmental glass markets are projected to continue growing at 8.2% annually?
- 1 current Flat Glass capacity could be increased by 50 million sq. ft. by converting to float?
- 0 conversion will cost a minimum of \$6.95 million?
- 1 capacity could be increased by 1/3 by expanding the Flat Glass plant (\$11.08 million minimum)?
- 2 one of CGD's scientists has discovered a new float process?
- 1 the cost of goods manufactured in Flat was up 4% last quarter?
- 3 production of environmental glass was 120% of normal last quarter, 126% this month?
- 1 the increased production has been achieved by reducing maintenance and increasing overtime for the third shift?
- 2 trade glass markets are projected to decline by 5% next year?

2. How was the capacity problem handled?

- 4 don't know
- 2 it was discussed, but no concrete action was taken
- 2 further discussions were scheduled
- 0 decided to convert to float
- 1 decided to expand the plant
- 0 decided to cut back on sales
- 0 decided to build a new plant
- 2 decided to use other Looking Glass or competitors' plants, at least temporarily, to increase capacity

other: 0

D. LIGHTING PRODUCTS (CGD)

1. Did you know that . . .

- 4 the Lighting Products plant has the oldest machinery in the company?
- 4 the plant has a problem with EPA over emissions?
- 0 the newspaper has reported that these emissions are killing trees?
- 0 glass excess on bulbs and envelopes is causing customer complaints?
- 0 maintenance costs rose 3% last month?
- 2 although costs are increasing, prices must stay low to remain competitive?
- 2 there are some problems with packaging?
- 0 the life expectancy of a melting furnace is 7.6 years?
- 0 one melting furnace in Lighting Products is 7 years old?
- 1 laser cutting might be a solution to the glass excess problem?

2. What was done about the "aging" problems in Lighting Products?

- 7 don't know
- 0 it was discussed, but no concrete action was taken
- 1 further discussions were scheduled
- 0 decided to close the plant for refurbishing
- 1 a plan was developed for phased equipment modernization
- 0 decided to do whatever was needed to comply with EPA
- 0 a new packaging system was decided on
- 0 decided to sell the Lighting Products plant
- 0 concrete steps were taken to investigate laser cutting

other: 1

E. PRODUCTION CAPACITY PROBLEMS/AUTO GLASS (IGD)

1. Did you know that . . .

- 9 the plant may not be able to handle the increased production capacity demands needed to secure new contracts with foreign car manufacturers?
- 2 an entirely new production line would be required to increase production by 25% (\$18 million)?
- 0 the plant is unable to buy a neighboring piece of real estate for expansion purposes?
- 2 the new production line would take at least two years to build?
- 0 there is a plan to replace most of the machinery over the next 10 years?
- 3 an annual growth rate of 6% is predicted for domestic car production?
- 3 IGD is considering entering the truck window market?

2. What was done about the Auto Glass capacity problem?

- 2 don't know
- 3 it was discussed, but no concrete action was taken
- 6 further discussions were scheduled
- 0 decided to build a new production line
- 0 decided to replace all the machinery within the next 10 years
- 0 decided to build a new Auto Glass plant on the West Coast
- 1 decided to secure either the Japanese or German foreign car contracts
- 0 decided to temporarily increase production time by running additional shifts until a more permanent solution can be obtained

other: 1

F. CAPACITY PROBLEMS - SPECIALTY GLASS & GLASS PIPING (IGD)

1. Did you know that . . .

- 3 Specialty Glass makes a substantial amount of the borosilicate glass used at the Glass Piping plant?
- 0 the variable overhead (reflecting utility costs) at Specialty Glass is +21%?
- 5 the Specialty Glass plant has shown a marked drop in income over the last quarter?
- 4 both plants are underutilizing their capacity?
- 1 Glass Piping's high raw materials cost is partly due to their purchase of small quantities?
- 3 an increasing percentage of West Coast consumers are buying products from both plants?
- 0 Glass Piping needs to increase the versatility of its machinery to meet varied glass specifications?
- 4 the combination of both plants at a West Coast site would reduce delivery costs and improve customer relations?

2. What was done about the capacity problem?

- 4 don't know
- 3 it was discussed, but no concrete action was taken
- 5 further discussions were scheduled
- 0 decided to sell current plant sites and create a combined plant on the West Coast
- 0 decided to decrease the production capacity of both plants
- 0 decided to sell the current machinery at Glass Piping and buy new, more flexible machinery
- 0 decided to focus production on microwave oven windows and de-emphasize the spacecraft window line at Specialty Glass
- 0 decided to push for a greater market share for Glass Piping products
- 1 decided to consolidate at one of the present sites

other: 1

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